Board of Trustees Academic and Student Affairs Committee October 24, 2022 at 9:00 Zoom Meeting – No Physical Location Available

The public is invited to view the meeting on YouTube. The link to the Board of Trustees YouTube page can be found the Board website: <u>https://www.maine.edu/board-of-trustees/</u>

AGENDA

9:00am - 9:45am Tab 1	Faculty Initiated Dialogue Retention and improving open house events
9:45am - 9:55am Tab 2	Student Representative Discussion
9:55am - 10:25am Tab 3	Chief Academic Officers (CAO) Update
10:25am - 10:35am Tab 4	New Academic Program Proposal: B.S. Business Administration - Business Information Systems and Security Management, UM
10:35am - 10:45am Tab 5	New Academic Program Proposal: B.S. Industrial Engineering, USM
10:45am - 10:50am Tab 6	Proposed New Board of Trustee Policy 315 Commemorative Naming and Renaming of Academic Units and Programs
10:50am - 11:00am Tab 7	Proposed Changes to Board Policy 301.3 - USM Mission
11:00am - 11:05am Tab 8	Awarding of Academic Degrees
11:05am - 11:10am Tab 9	Update - Academic and Student Affairs Work Plan
11:10am - 11:20am Tab 10	Update - NECHE
11:20am - 11:25am Tab 11	Academic Year Calendar AY 2027-2028 and AY 2028-2029
11:25am - 11:35am	

Tab 12 Enrollment Update

11:35am - 12:05pmExecutive SessionThe Academic and Student Affairs Committee will enter Executive Session under
the provision of: MRSA Section 405 6-A.

Following the executive session, the committee will reconvene the public meeting to discuss the following item:

Tenure Request, Professor in the College of Education and Human
Development, UM
Tenure Request, Professor in the College of Engineering, UM
Tenure Request, Professor in the College of Management and Human
Service, USM

Items for Committee decisions and recommendations are noted in red.

Note: Times are estimated based upon the anticipated length for presentation or discussion of a particular topic. An item may be brought up earlier or the order of items changed for effective deliberation of matters before the Committee.

University of Maine System Board of Trustees

AGENDA ITEM SUMMARY

NAME OF ITEM: Faculty Initiated Discussion

INITIATED BY: David M. MacMahon, Chair

BOARD INFORMATION: X

BOARD ACTION:

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BOARD POLICY:

N/A

UNIFIED ACCREDITATION CONNECTION:

N/A

BACKGROUND:

The Academic and Student Affairs (ASA) Committee of the Board invites faculty-rank members of the Faculty Board representatives to bring forward discussion items relevant to their campus communities and the University of Maine System.

The faculty representatives, working in conjunction with the ASA Chair, have decided that the October 2022 ASA meeting's subject will be around student success. Supplemental materials for pre-review are linked below and attached.

Linked Resources:

- IPEDS Retention, Graduation, and Outcome Measures:
 - <u>https://public.tableau.com/app/profile/ums.academic.affairs/viz/IPEDSRetentionandGr</u> <u>aduation/Retention</u>
- Return Rates
 - Fall-to-Fall: <u>https://public.tableau.com/app/profile/ums.academic.affairs/viz/ReturnRatesFall-to-Fall_16343274816180/UndergraduateSummary</u>
 - Fall-to-Spring: <u>https://public.tableau.com/app/profile/ums.academic.affairs/viz/ReturnRatesFall-to-Spring_16449608464530/UndergraduateSummary</u>
- Yearly Success & Progress Rates / First Year Outcomes:
 - <u>https://public.tableau.com/app/profile/ums.academic.affairs/viz/YearlySuccessProgress/YearlySuccessProgressRates</u>

Attached materials:

- UMS Student Success Guidance Document
- IPEDS Graduation Retention
- Chronicle Student Success Series

10/13/2022

Best Practices and Successful Initiatives

Every year, a significant number of students across the country leave college and fail to complete their degree. According to the National Student Clearinghouse® Research Center^M (2022), nearly 25 percent of students who entered college in the fall of 2020 at four-year public institutions did not return to their institutions for a second year. While the retention rate for those enrolled full-time increases to 78.5 percent, there is a dramatic drop for those enrolled part-time with nearly half (50.1%) retained. The data in the chart below illustrates the retention rate at all of our institutions against the national average. It is important that each institution look more specifically at comparators within their specific peer group when setting benchmarks and goals.



FALL 2020 FIRST-TIME, FULL-TIME UNDERGRADUATE RETENTION (IPEDS)

Specific to UMS is the concept of return rate, which allows us the opportunity to see the retention rates for populations other than first-time undergraduates (e.g., sophomores, juniors, etc.) based on their cumulative credit hours. The return rate answers the question, "Of those students we expect to return in the following fall term, what percentage did?"

The chart below represents the percentage of undergraduate, degree/certificate-seeking students enrolled as of October 15, 2020 who were subsequently enrolled on October 15, 2021. These rates exclude students who earned an academic award (certificate, associate's, or bachelor's) between those two dates.

	Cumulative								
Status	Credit Hours	UM	UMA	UMF	UMFK	UMM	UMPI	USM	Total
Full-		73.8							
Time	0 to 29	%	58.9%	64.4%	64.1%	51.5%	61.0%	63.2%	68.0%
		87.7							
	30 to 59	%	74.1%	83.6%	83.0%	75.8%	68.5%	78.0%	83.1%
		90.4							
	60 to 89	%	77.1%	91.3%	81.0%	81.6%	85.2%	85.8%	87.4%
		76.9							
	90+	%	69.7%	64.3%	86.7%	41.7%	61.1%	73.9%	73.7%
		82.3							
	Subtotal	%	69.0%	76.2%	77.3%	64.5%	67.7%	74.5%	77.6%
Part-		57.5							
Time	0 to 29	%	50.4%	57.1%	31.6%	36.8%	43.8%	37.8%	47.6%

al		80.4 %	63.6%	75.1%	71.0%	60.2%	62.9%	70.0%	73.4%	
	Subtotal	65.8 %	58.8%	56.7%	59.0%	49.5%	49.5%	55.9%	58.3%	
	90+	%	58.9%	41.7%	63.8%	61.9%	43.8%	56.1%	58.2%	
		60.4								
	60 to 89	68.6 %	66.0%	72.7%	46.7%	64.7%	61.0%	65.6%	66.1%	
	30 to 59	67.8 %	60.0%	57.1%	55.0%	46.7%	53.5%	55.1%	60.0%	
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Learning more about the factors that affect retention, as well as exploring ways and means of improving retention can help institutions avoid the costs associated with high attrition rates. The current landscape of higher education calls for institutions to meet the needs of a changing student population with competing priorities in an increasingly complicated college experience extending beyond initial enrollment. Since today's college students have more choices and challenges than ever, stopping out or transferring has become commonplace. One of the most widely researched topics in higher education is student retention.

THEORY

Tinto's 'Model of Institutional Departure' (1993)

One of the most prominent theorists on student retention is Vincent Tinto. Tinto's theory of student retention was first published in 1975, updated in <u>1989</u> and revised in 1993. Developed primarily for student retention issues at four-year colleges, his "Model of Institutional Departure' (1993) has been widely tested and accepted by the educational community for over four decades. This model identifies three major sources of student departure: <u>academic difficulties</u>, <u>challenges in resolving educational and occupational goals</u>, and a <u>failure to become</u> <u>academically and socially connected</u> with the institution. Whether a student departs from an institution is largely a result of the extent to which the student develops a strong sense of belonging and integration within the community.

Building off of Tinto's initial model, Pascarella and Terenzini (1979) stated that the absence of significant interactions with other college members is the single leading predictor of college attrition. Student interaction must go beyond the classroom in order for students to feel integrated. Research designed to test Tinto's model often confirms the importance of social and academic integration and the decision to withdraw (Pascarella and Terenzini, 1979; Chapman and Pascarella, 1983, and Bean, 1980). Integration is an important component for retaining all students, and it is particularly important in retaining minority students.

Peer and faculty mentoring programs have also been found to be effective retention strategies particularly with programs focusing on providing social and academic support.

There are many factors that have been found to influence retention and to be strongly associated with student persistence. These factors include initial student commitments, peer support, involvement in the institution's academic life, and frequency and quality of faculty-student interaction (Tinto, 1993; Pascarella & Terenzini, 1979) and vary among institutions. Institutions of Higher Education need to analyze the specific qualities and characteristics of their own students with the most beneficial and effective retention programs being those that are developed over time and are based on coordinated activities of continuous research, evaluation, and policy development.

More recently, Tinto (2012), offered a framework that institutions could use to enhance student success. He emphasizes the need for assessment and thoughtful reflection before initiating any plan and that there is no 'one size

fits all' intervention. As Tinto points out: "The number of retention programs matters less than where the programs are situated in the educational life of the institution and how they are organized and aligned one to another. Merely investing in retention programs does not mean taking student retention seriously" (p. 116). More recently, Tinto challenged institutions to refocus their lenses and see <u>Through the Eyes of Students</u> (2015, 2017) and move <u>From Retention to Persistence</u> (2016) stating, "To promote greater degree completion, institutions have to adopt the student perspective and ask not only how they should act to retain their students but also how they should act so that more of their students want to persist to completion." His view has continued to evolve related to persistence as it pertains to equity and enabling the success of all students (<u>Reflections on Student Persistence</u> (2017). While related, these perspectives are not the same.

"HOLISTIC" STUDENT SUCCESS: AN INSTITUTION WIDE COMMITMENT

Students enter our institutions with a <u>variety of attributes</u> (prior educational experiences, family background, cultural and social preparation, goals/commitments, etc.) which impact their motivation, "grit" and resilience. As they join our institutions, the academic (in the classroom and via co-curricular activities, and in interactions with faculty and staff) and social (extra-curricular and peer group interactions) systems combine to then impact that student's academic and social integration, engagement and motivation to stay enrolled and complete. Ultimately, best practices start with obtaining a clear understanding of the issues impacting the retention on campus. For an institution focused on improving student success outcomes, reviewing data and developing a definition of success for a particular campus is an essential first step (Fishman, Ludgate & Tutak, 2017). Once this goal is clear, the institution can develop a holistic, student-centered strategy across all dimensions of the student experience including the classroom, support services, campus operations, and relationships that integrate with the broader community (Figure 2); every part of the campus community contributes to the ultimate success of that student. Strategies for improving retention must reflect student needs and circumstances and must be designed and implemented to support reaching their academic goals.



PROGRAMS and INITIATIVES

Institutions of higher education consist of complex structures that encompass broad decision-making systems and multiple power and authority structures that can impede goals. One of the greatest challenges to improving student success is overcoming obstacles on how to effectively identify and implement the changes needed. The following are examples of institutions that have engaged in the challenging work of analyzing data, engaging in a detailed review of structures, evaluating programs and needs with the goal of systemic change.

OVERVIEW AND SYNTHESIS OF BEST PRACTICES

There are numerous examples of best practice in student success and completion. These resources provide a comprehensive overview of those key elements fundamental to any student success initiative: applying data, improving the academic experience, integrating academic support and promoting and supporting students' well-being. As with any broad based student success initiative, breaking down silos and enabling a cross-institutional approach to student success is key in all of these overviews.

- Chronicle of Higher Education <u>The Truth About Student Success</u>
- EAB <u>Student Success Playbook</u>
- Hanover <u>Best Practices in Student Return</u>
- Deloitte <u>Success by Design</u>

ANALYTICS AND PREDICTIVE MODELING

Several institutions have developed capacity for analyzing data using several data analytic companies including:

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Georgia State University – GSU's work with the <u>EAB Student Success Collaborative</u> enabled the development of its <u>GPS Advising approach</u> which makes the use of over 800 analytics to track and enable student success. Over 500 institutions, including all campuses within the UMS, utilize the EAB platform.

<u>University of South Florida</u> first developed its own predictive analytic tools and, when retention rates did not improve, they contracted with <u>Civitas Learning</u>

SNHU, ADELPHI, Harvard Business School Online, WGU utilize Eduventures.

Other examples: <u>Middle Tennessee State University</u>, Hawaii Pacific University, Marist College, Purdue University, NYU, Miami University of Ohio, <u>University of North Carolina Greensboro</u>

Bucknell University, working with <u>Deloitte</u> and utilizing predictive analytics, examined <u>Early Intervention for</u> <u>Students at Risk</u>.

Within the University of Maine System

- The <u>UMS Dashboard</u> provides both real time application and enrollment data but also comprehensive retention, return rate and completion data for every university, separated into specific student populations. The UMS Student Success Steering Committee reviews this data annually.
- Via the **multi year financial analysis** (MYFA) conducted by the UMS Finance area, predictive enrollment modeling has become an essential component of the ongoing and annual budget process.
- In 2019, the UMS began looking at the "return rate" of students by class level from one year to the next this return rate enables a closer look at retention from the perspective of all students, not just the full time, first time students captured within the IPEDS studies.

SUMMER BRIDGE AND ORIENTATION INITIATIVES

- University of Texas at Austin <u>Building Resilience</u>, reduce attrition in less than an hour
- Georgia State University <u>Summer Success Academy</u>

Within the University of Maine System

Orientation

University of Maine at Augusta - Online New Student Orientation (ONSO) – This comprehensive, easily
accessed, asynchronous, self-paced program includes multiple modules to introduce new students to UMA
and to provide information on services, resources and policies. ONSO significantly improves participation
rates and the capacity to track effect.

Summer Programs

- UM <u>Summer Preparation</u>
- **UMFK, UMM** offer Summer Bridge programs, **USM** offers a program via its TRIO Student Support Service program

ADVISING AND TECHNOLOGY

- **<u>University of Alaska</u>** student success through consistent and comprehensive advising.
 - First Year Advising and Success
 - Campus-Wide Advising Alignment
 - Academic Pathways meta majors, career clusters, academic umbrellas
 - Seawolf Tracks EAB SSC
- <u>Florida International University</u> invested in professional advisors focused on course planning and navigation and have seen substantial increases in both retention and completion.

- <u>STAR</u> **University of Hawaii** technology that provides students a clear pathway to graduation by allowing them to track progress, review requirements, and explore the impact of scheduling and changes in major on time to graduate.
- **Georgia Southern University** <u>Academic Success Center</u> dedicated to providing academic support for all students by fostering positive academic mindset, knowledge of resources and belonging within the university community.
- University of Alabama <u>Capstone Center for Student Success</u> –provides a network of services to support holistic student success, including a combination of academic support services, specialized support programs, and intentional partnerships

Within the University of Maine System

- **EAB-**<u>Navigate</u> A powerful advising and communication tool to support and promote student success and engagement used by <u>UMA</u>, <u>UM</u>, UMPI, and beginning in 2020, UMF, UMFK and USM.
- <u>Advising and Course Selection</u> (ACS) -- University of Southern Maine An advising partnership to develop as a self-directed learner, explore resources, and understand and follow the advising and registration processes.
- <u>Trio programs</u> UMS has the full range of Trio programs. Most notably, 6 of 7 campuses have <u>Student</u> <u>Support Service programs</u> which are designed to provide students with the academic support and coaching needed to complete once admitted to one of our institutions. The retention rates of SSS students exceed the rates of the regular cohort and could serve as a good model for all students.
- Proactive Transfer University of Maine at Augusta Transfer evaluation process designed to review upfront substitutions, offer prior learning assessment options and incorporates educational planning to accelerate progress towards degree completion.
- Degree Planning- an RFP for a comprehensive degree planning tool that would enable advisors and students to work on pathway development prior to and throughout enrollment as well as explore major options was conducted during Spring 2022. This would be a major enhancement in our student success and completion work. Final result is still being determined.

ACADEMIC EXPERIENCE

Improving the Educational Experience

- <u>Complete College America</u> is a national initiative whose "Game Changers" provided insight into best practice initiatives such as 15 to Finish, Math Pathways, Guided Pathways, Meta-majors, Co-requisite support and Academic Maps with Proactive Advising. CCA recently updated their "Game Changers" to address at risk and underrepresented populations with a focus on equity.
 - Led by the Education Commission of the States, <u>Strong Start to Finish</u>, is focused on completion of math and English in the first year.
 - <u>Guided pathways</u> is an initiative that is expanding beyond community colleges and is focused on creating clear academic maps to degrees and those pathways that get them to completion.
 - Academic Maps are in use by numerous institutions and help in the development of guided pathways. <u>Florida State University</u> has been utilizing maps for over a decade and has seen a substantial improvement in completion rates. *Within the UMS*, UMA and UMF utilize academic maps for their students; UMF has developed a "home grown" software solution to assist in this.

- **The Chronicle of Higher Education Monograph** <u>The Truth About Student Success</u> details several best practices including examining remedial and gateway courses, developing "meta-majors", involving industry leaders in the coordination of professional degree tracks, coupling financial supports with extensive advising (for all students but specifically high risk populations), and adjusting the academic calendar to meet the needs of working students and enable faster completion.
- **AAC&U** identified <u>High Impact Educational Practices</u> these include many of the educational practices referenced elsewhere in this overview including first year experiences, learning communities, etc.
- *Peer-to-peer support systems* are in place in many institutions these may be peer tutoring, peer mentoring or peer counseling. Examples exist throughout the US, and many are shown to create additional supports for students, especially first generation students. *Within the UMS,* a peer-to-peer financial literacy program is in place, peer tutoring is in place across many campuses, and peer counseling is in place in specific areas such as student affairs.
- Streamline the Transfer Process:
 - University of Central Florida <u>DirectConnect</u> program

Within the University of Maine System

- University of Maine System- Led by the University of Maine, <u>UMS Transforms</u> focus on student success and retention contains three elements, two of which are dedicated to improving the college experience: Research Learning Experiences which introduce students to discovery, knowledge creation and research within their first year and Gateway courses which identify those critical gateway STEM courses which can be a barrier to academic progress and redesigning the curriculum to employ proven learning approaches.
- **University of Maine at Augusta** -Class Steward Program A unique embedded service and early alert strategy. Class stewards are typically staff members (and in some cases students) who work within the Blackboard site to monitor student progress and encourage completion.
- University of Maine and University of Southern Maine Maine Learning Assistants (UM) and Learning Assistant Program (USM) – These programs utilize undergraduate or graduate students who support faculty in instruction and facilitating student discussion. Learning Assistants participate in regular professional learning sessions and weekly seminars.
- **UMFK, UMPI and USM,** as a part of their work with Academic Partnerships, have introduced two eightweek sessions per semester within selected academic programs, enabling students to attend full time within a semester (UMPI already had this in practice via its YourPace program).
- The University of Maine System, the Maine Community College System and Maine Department of Education are working on a collaborative with the Dana Center focused on developing more clearly articulated math pathways from K-20.
- **The University of Maine System** is an active participant in CCA and a staff member serves as the Maine state liaison.

Completion Programs

- o <u>15 to Finish</u> University of Hawaii
- Finish in Four University of South Florida (also <u>FUSE</u> for two year transfer student)
- <u>Indiana State University</u> created "graduation specialist" roles which provide additional support and intervention for students in their junior and senior years.
- State of Tennessee
 - <u>Complete College Tennessee Act</u>
 - Drive to 55
 - <u>TN Promise</u>
 - <u>TN Transfer Pathway; TN Reverse Transfer</u>
 - <u>TN Reconnect</u>

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Within the University of Maine System

- o Think 30 Initiative University of Maine
- 15 to Finish University of Southern Maine
- **<u>Finish in Four</u>** University of Maine at Presque Isle
- **Reverse Credit Transfer** The UMS has a comprehensive reverse credit transfer agreement with the Maine Community College System.
- State of Maine
 - <u>Maine Spark</u>

First Year Experience

First year experiences include first year seminar/success courses, living-learning communities, cohort based interest groups, etc. Sparked by the work of the <u>National Resource Center for the First Year Experience and Students in Transition</u> and by its founder, <u>John Gardner</u>, institutions throughout the country have implemented comprehensive first year experience initiatives. With the goal of fostering a sense of belonging and connectedness to the academic and social experience, programs such as that at <u>Southern Utah University</u> offer good examples.

Within the University of Maine System, the University of Maine has launched the implementation of its <u>first</u> <u>year student success initiative</u>s identified as a part of a campus wide study in 2018/2019. Other campuses within the System also offer a variety of first year experiences and workshops.

Faculty Development Initiatives

- **Purdue University** <u>Impact</u> A campus wide effort to improve undergraduate teaching and learning
- Rutgers University P3 Collaboratory for Pedagogy, Professional Development, and Publicly-Engaged Scholarship is a comprehensive development center serving the needs of the existing and emerging professoriate, and provides support to increase student success through excellence in teaching, high impact scholarship (particularly publicly engaged scholarship), leadership development, and career success.
- **University of Maryland Global Campus** <u>Center for Innovation and Learning in Student Success</u> leading the search for next-generation learning models, CILSS supports a collaborative innovation process that selects the highest priority projects to improve the learning experience through rapid prototyping, piloting process, and evaluation.
- California State University, Bakersfield <u>Christa McAuliffe Excellence in Teacher Education Award</u>, -An AASCU 2019 Award winner, the <u>Kern Rural Teacher Residency Program</u> is designed to increase the number of teachers amid shortage and has morphed into 3 residency programs

Within the University of Maine System

- <u>Collaborative Faculty Institute</u> University of Maine at Augusta An innovative teaching and learning institute offered for the past 30 years (aka the E-Learning Institute). A collaborative event, the Institute has a system-wide planning committee with faculty and staff representing each campus.
- <u>UMS SAALT</u> Institute (Summer Academy for Adult Learning and Teaching) Faculty across the UMS gather to learn and implement best practice learning and teaching practices for adult, non-traditional learners
- <u>UMaine Center for Innovation in Teaching and Learning (CITL)</u> University of Maine -- CITL currently develops and delivers a series of workshops, programs and trainings for faculty and graduate students with a focus in areas relating to research and innovation in teaching and learning, including the use of new technologies in support of teaching.
- UMaine Student Success Initiative <u>Faculty Support/Development</u>

IMPROVING STUDENT WELL-BEING

Helping first generation and other student populations thrive socially and emotionally is an important component of any student success initiative. Student support groups, special interest groups, support for food and housing insecurity, support for students recovering from addiction, helping students access resources outside the institution (public benefits as an example) are all part of what any institution needs to plan for as a part of a student success initiative:

- "Wrap around" services are not those needed just for returning adult students in fact, more students across the spectrum require a range of services to enable them to stay in and complete college (Georgetown University Scholars Program is a good example).
 - Creative financial aid strategies to help students stay in or return to school such as Wayne State's "<u>Warrior Way Back</u>" program. Dillard University's <u>SAFE fund</u> provides small amount funding to cover small balances or other emergencies. <u>The MSU Spartan Advantage Program</u> – Michigan State University - SPAD reduces the educational loan debt and supplies students with the final financial assistance needed to fully cover tuition, fees, room, board, and even books.
- Robust career development programs which include job experience help motivate students (<u>Clemson</u> <u>University</u> created paid, on-campus internships for students as a way to increase engagement)

Within the University of Maine System

- Student Health and Counseling Services a wide array of in person counseling, workshops and seminars
 offered throughout the year, and access to an online mental health platform, SilverCloud, are available for
 all UMS students.
- Food pantries, support for locating housing and liaisons for homeless students exist on all campuses.
- **Wrap around services** specifically for adult learners are available through the UMS Student Success Center.
- UMS implemented a **small debt forgiveness program** for students who left three or more years ago with \$2500 in institutional debt (similar to Wayne State's "Warrior Way Back" program).
- Via <u>UMS Transforms</u>, the *Pathways to Careers* initiative focused on creating the critical linkages between academic experience and career success with a focus on expanding access to credit-bearing internships.

STUDENT SUCCESS LIFE CYCLE

How students' progress through an institution from enrollment to graduation and beyond is prompting more institutions to look more completely at the <u>Student Life Cycle</u> as they develop comprehensive success initiatives.

- <u>Georgia State University</u> Developing a Student Success Life Cycle model of innovative efforts for supporting disadvantaged students to degree completion. GSU has proven students from all backgrounds can succeed at high rates – "not through changing the nature of the students served, but through changing the nature of the institution that serves them". GSU employs a consistent, evidenced-based strategy based on the following student-centered initiatives
 - <u>Adaptive Learning Tools</u>
 - <u>Georgia State Lift</u>
 - <u>Keep Hope Alive</u>
 - Meta Majors
 - Panther Retention Grants
 - <u>Reduction of Summer Melt</u>
 - <u>Summer Success Academy</u>
 - Financial Management Center
 - <u>College to Careers</u>

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- <u>Elon University</u> Identified by AAC&U as high-impact practices structurally embedded within the program and have earned national recognition. Among the nation's best in key programs that enrich the college experience including: first-year seminars and experiences, common intellectual experiences, learning communities, writing-intensive courses, collaborative assignments and projects, undergraduate research, diversity and global learning, service learning and community-based learning, internships, and capstone courses.
- Northwest Missouri State University <u>Student Success Center</u> 2019 AASCU Excellence and Innovation Awards <u>Winner</u> - The Student Success Center focuses on transitioning, advising, supporting and connecting students through Academic Support, Advisement & Coaching, Academic Recovery, Orientation, FYE, Retention and Complete 30 campaign.

ADDITIONAL RESOURCES

- U.S. Department of Education Promising and Practical Strategies to Increase Postsecondary Success -<u>https://www.ed.gov/college-completion/promising-strategies/tags/Retention</u>
- o TRIO <u>www2.ed.gov/programs/triostudsupp/sss-fastfacts2016.pdf</u>
- Delloitte Success by Design <u>https://www2.deloitte.com/us/en/insights/industry/public-sector/improving-student-success-in-higher-education.html#endnote-sup-70</u>
- National Clearinghouse (data) <u>https://nscresearchcenter.org/snapshotreport35-first-year-persistence-and-retention/</u>
- Complete College America https://completecollege.org/
- The Chronicle Special Series: Student Success <u>https://www.chronicle.com/specialreport/Chronicle-Intelligence-/243</u>
- o EAB Student Success <u>https://eab.com/colleges-and-universities/student-success/</u>
- o American Association of State Colleges and Universities (AASCU), Innovations Exchange

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	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
University of Maine	77%	76%	78%	79%	78%	76%	80%	76%	76%	75%	75%	77%	74%	77%
University of Maine at Augusta	47%	48%	48%	53%	50%	50%	49%	47%	53%	52%	47%	57%	55%	58%
University of Maine at Farmington	75%	73%	70%	76%	74%	71%	71%	74%	74%	73%	72%	71%	73%	72%
University of Maine at Fort Kent	52%	65%	76%	64%	62%	64%	58%	64%	70%	74%	61%	64%	62%	65%
University of Maine at Machias	71%	74%	68%	66%	61%	65%	66%	72%	62%	62%	63%	54%	48%	54%
University of Maine at Presque Isle	61%	58%	65%	64%	63%	59%	59%	49%	61%	61%	57%	58%	63%	69%
University of Southern Maine	65%	63%	64%	68%	65%	63%	65%	65%	62%	61%	67%	68%	68%	69%
UMS	71%	70%	71%	72%	71%	69%	72%	70%	70%	70%	70%	72%	70%	72%
Central Maine Community College	54%	51%	62%	68%	62%	52%	59%	56%	53%	58%	59%	53%	51%	48%
Eastern Maine Community College	56%	54%	54%	56%	51%	55%	56%	57%	64%	57%	54%	51%	54%	49%
Kennebec Valley Community College	63%	58%	64%	62%	58%	53%	60%	56%	57%	64%	61%	61%	57%	60%
Northern Maine Community College	52%	81%	63%	64%	55%	61%	54%	48%	55%	63%	52%	66%	51%	52%
Southern Maine Community College	51%	51%	49%	53%	52%	54%	54%	52%	55%	55%	54%	51%	54%	53%
Washington County Community College	46%	45%	61%	56%	41%	50%	47%	54%	61%	51%	60%	58%	58%	46%
York County Community College	44%	.35%	72%	55%	49%	57%	58%	54%	54%	51%	56%	53%	57%	49%
MCCS	53%	51%	57%	58%	54%	54%	56%	54%	56%	57%	56%	54%	54%	52%
Husson University	68%	70%	65%	66%	74%	72%	71%	77%	73%	76%	76%	75%	73%	76%
Maine Maritime Academy	85%	94%	79%	79%	73%	74%	75%	78%	83%	86%	77%	84%	80%	77%
Thomas College	63%	55%	67%	60%	60%	66%	65%	68%	70%	70%	62%	65%	72%	75%
University of New England	76%	77%	77%	80%	74%	75%	74%	80%	75%	81%	77%	76%	81%	75%
University of New Hampshire-Main Campus	87%	89%	87%	88%	87%	86%	86%	86%	85%	86%	86%	86%	86%	86%
University of Vermont	86%	85%	85%	87%	85%	85%	85%	87%	86%	86%	86%	87%	87%	85%

All First-Time, Full-Time or Part-Time Undergraduate Retention Rates by Fall Cohort

Note: For 4-year institutions, retention rates are for Bachelor's degree-seeking undergraduates. For 2-year institutions, retention rates are for degree/certificate-seeking undergraduates. Source: IPEDS Data Center (https://nces.ed.gov/ipeds/use-the-data)

Produced by Robert Zuercher@maine.edu on October 6, 2022.

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	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
University of Maine	78%	76%	79%	79%	78%	76%	81%	77%	76%	76%	75%	78%	74%	76%
University of Maine at Augusta	53%	55%	52%	53%	48%	52%	53%	49%	56%	56%	54%	59%	61%	62%
University of Maine at Farmington	75%	73%	70%	76%	74%	71%	71%	75%	75%	74%	72%	71%	73%	72%
University of Maine at Fort Kent	51%.	65%	76%	65%	62%	64%	59%	64%	70%	75%	61%	63%	65%	68%
University of Maine at Machias	73%	75%	71%	67%	64%	67%	67%	76%	63%	64%	63%	55%	49%	58%
University of Maine at Presque Isle	63% 🔹	58%	67%	64%	63%	58%	59%	51%	63%	63%	57%	62%	63%	71%
University of Southern Maine	67%	64%	65%	70%	66%	64%	67%	65%	64%	63%	68%	70%	69%	70%
UMS	72%	71%	72%	74%	72%	70%	73%	71%	72%	71%	71%	73%	71%	74%
Central Maine Community College	62%	50%	64%	71%	60%	53%	64%	59%	57%	60%	62%	55%	57%	52%
Eastern Maine Community College	59%	56%	54%	58%	55%	59%	60%	62%	69%	58%	56%	53%	59%	51%
Kennebec Valley Community College	65%	67%	68%	68%	67%	57%	68%	57%	67%	68%	63%	65%	63%	64%
Northern Maine Community College	55%	83%	66%	68%	59%	66%	56%	54%	59%	66%	54%	70%	55%	53%
Southern Maine Community College	52%	54%	51%	58%	54%	56%	55%	56%	55%	58%	56%	54%	57%	55%
Washington County Community College	53%	42%	63%	62%	43%	53%	48%	56%	61%	54%	62%	62%	60%	51%
York County Community College	53%	43%	90%	53%	54%	52%	63%	61%	60%	60%	60%	60%	66%	60%
MCCS	56%	55%	59%	62%	56%	56%	59%	58%	59%	59%	58%	57%	58%	54%
Husson University	69%	70%	65%	66%	74%	73%	72%	77%	73%	76%	77%	75%	73%	77%
Maine Maritime Academy	85%	94%	79%	79%	73%	74%	75%	78%	83%	86%	77%	84%	80%	77%
Thomas College	64%	56%	66%	61%	60%	66%	65%	68%	71%	70%	63%	65%	72%	75%
University of New England	77%	77%	77%	80%	75%	75%	74%	80%	75%	81%	78%	76%	81%	75%
University of New Hampshire-Main Campus	87%	89%	87%	88%	87%	86%	86%	86%	85%	86%	86%	86%	86%	86%
University of Vermont	86%	86%	85%	87%	85%	85%	86%	87%	86%	87%	86%	87%	87%	85%

Note: For 4-year institutions, retention rates are for Bachelor's degree-seeking undergraduates. For 2-year institutions, retention rates are for degree/certificate-seeking undergraduates.

Source: IPEDS Data Center (https://nces.ed.gov/ipeds/use-the-data)

Produced by Robert Zuercher@maine.edu on October 6, 2022.

First-Time, Part-Time Undergrad	uate Retention Rates by Fall Cohort
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	2006	2007	2008	2009.	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
University of Maine	31%	64%	57%	35%	59%	44%	52%	35%	50%	40%	35%	31%	56%	32%
University of Maine at Augusta	40%	35%	39%	54%	52%	46%	42%	43%	48%	44%	36%	51%	41%	49%
University of Maine at Farmington	100%**	33%**	75%**	100%**	0%**	100%**	0%**	0%**	0%**	0%**	22		100%**	0%**
University of Maine at Fort Kent	75%**	67%**	67%**	40%*	1	75%**	0%**	50%**	67%**	50%**	100%**	100%**	22%*	20%*
University of Maine at Machias	50%*	50%**	42%	40%*	0%*	·33%*	67%*	20%*	50%**	43%*	60%*	25%**	25%**	0%*
University of Maine at Presque Isle	27%		33%*	- 60%	50%*	83%*	40%*	37%	25%*	22%*	50%*	10%	60%*	44%*
University of Southern Maine	39%	45%	47%	44%	49%	41%	33%	56%	36%	40%	47%	31%	47%	30%
UMS	39%	48%	48%	49%	50%	46%	43%	44%	44%	41%	41%	40%	43%	38%
Central Maine Community College	46%	52%	59%	55%	69%	51%	48%	47%	41%	51%	51%	47%	33%	38%
Eastern Maine Community College	41%	45%	53%	45%	37%	38%	41%	36%	51%	52%	46%	38%	29%	35%
Kennebec Valley Community College	58%	44%	59%	50%-	48%	43%	47%	52%	45%	58%	57%	56%	47%	55%
Northern Maine Community College	30%	62%	52%	39%	34%	39%	45%	31%	45%	44%	43%	44%	30%	44%
Southern Maine Community College	45%	43%	43%	36%	48%	49%	50%	41%	54%	47%	50%	43%	47%	49%
Washington County Community College	19%	54%	55%	26%	29%	23%	0%**	0%*	62%	18%	43%	33%	40%	32%
York County Community College	38%	30%	52%	57%	43%	66%	50%	43%	47%	44%	54%	43%	44%	34%
MCCS	44%	43%	51%	45%	49%	49%	48%	42%	49%	49%	51%	45%	42%	44%
Husson University	25%	38%*	50%*	·67%*	50%**	50%**	60%	0%**	40%*	17%*	60%	63%*	67%**	20%*
Maine Maritime Academy	222	<u> </u>	°	-22 J	-			122						
Thomas College	57%	50%	100%**	0%**			67%**	33%**	50%**		0%**	0%**		
University of New England	0%**		100%**		0%**	0%**	0%**		50%**	50%**	0%**		0.040	0%**
University of New Hampshire-Main Campus	0%**			-	,	-				**			-	
University of Vermont	33%	17%	50%	56%*	43%	45%	50%	50%	50%	69%	75%	60%	17%	60%
							2.070	2070	23/0	0070	, 370	3370	-4770	0070

* Adjusted cohort < 10

** Adjusted cohort < 5

Note: For 4-year institutions, retention rates are for Bachelor's degree-seeking undergraduates. For 2-year institutions, retention rates are for degree/certificate-seeking undergraduates. Source: IPEDS Data Center (https://nces.ed.gov/ipeds/use-the-data)

Produced by Robert Zuercher@maine.edu on October 6, 2022.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
University of Maine	60%	59%	56%	60%	55%	59%	58%	60%	57%	56%
University of Maine at Augusta	16%	13%	12%	12%	12%	14%	15%	15%	13%	15%
University of Maine at Farmington	59%	58%	55%	54%	59%	56%	51%	52%	58%	60%
University of Maine at Fort Kent	33%	38%	44%	47%	31%	27%	30%	37%	36%	41%
University of Maine at Machias	38%	29%	31%	31%	29%	27%	34%	30%	31%	27%
University of Maine at Presque Isle	30%	37%	30%	46%	45%	35%	26%	34%	36%	33%
University of Southern Maine	33%	30%	34%	32%	33%	34%	33%	39%	40%	36%
UMS	49%	48%	46%	48%	47%	48%	46%	49%	50%	49%
Central Maine Community College	24%	25%	24%	23%	27%	26%	23%	29%	29%	25%
Eastern Maine Community College	26%	32%	29%	25%	25%	28%	26%	28%	26%	24%
Kennebec Valley Community College	40%	34%	42%	27%	35%	26%	45%	45%	35%	39%
Northern Maine Community College	43%	39%	30%	39%	34%	35%	45%	42%	37%	42%
Southern Maine Community College	18%	18%	13%	15%	17%	16%	20%	21%	21%	22%
Washington County Community College	55%	44%	35%	32%	37%	40%	47%	43%	50%	48%
York County Community College	11%	19%	17%	22%	19%	28%	18%	22%	27%	32%
MCCS	26%	26%	22%	22%	24%	24%	26%	28%	27%	27%
Husson University	37%	41%	45%	40%	44%	54%	54%	54%	57%	58%
Maine Maritime Academy	69%	74%	74%	70%	59%	62%	68%	74%	70%	73%
Thomas College	45%	46%	44%	46%	45%	45%	48%	48%	51%	51%
University of New England	57%	58%	58%	61%	65%	59%	60%	64%	68%	62%
University of New Hampshire-Main Campus	76%	78%	80%	77%	80%	78%	77%	77%	77%	77%
University of Vermont	72%	76%	76%	76%	77%	74%	75%	76%	77%	76%
	-									

First-Time, Full-Time Undergraduate Graduation Rates (150% of Normal Time) by Fall Cohort

Note: For 4-year institutions, graduation rates are for Bachelor's degree-seeking undergraduates who completed a Bachelor's degree. For 2-year institutions, graduation rates are for degree/certificate-seeking undergraduates who completed a degree/certificate.

Source: IPEDS Data Center (https://nces.ed.gov/ipeds/use-the-data)

Produced by Robert.Zuercher@maine.edu on October 6, 2022.

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THE CHRONICLE of Higher Education®

The Truth About Student Success

Myths, Realities, and 30 Practices That Are Working

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Promoting Students' Well-Being

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Many students drop out because they're drifting, or because life gets in the way. Six examples show how colleges are trying to motivate students and build safety nets.

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An Evolving Movement



DUCATORS have always wanted students to do well — and then left that more or less up to them. But in the last dozen years, the onus has shifted onto colleges, as a movement called student success has made greater completion rates, equity, and social mobility institutional responsibilities.

Higher education has perhaps never raised a banner so high. Yet the national fervor belies an uncomfortable truth: Improving student success is hard, and many campuses are struggling. Pursuing important goals under pressure, campus leaders don't want to admit that progress is elusive.

How did this movement arise? Several factors converged: Decades of research on how to engage students met a national call for accountability, as federal officials pushed assessment, accreditors demanded data, and states attached money to colleges' outcomes. President Obama set a bar for postsecondary attainment, and foundations devoted hundreds of millions of dollars to propel colleges into action. Low graduation rates drew new shame, as advocates pointed to barriers like remedial education as a bridge to nowhere.



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TAKEAWAYS

For many colleges,

retaining more students has become both a moral and financial imperative.

The pressure to raise

graduation rates creates a fixation on solutions, but best practices aren't quick fixes.

As a long-term investment,

creating a program or tool may not prove as sound as shoring up a system.

Breakthroughs can

come from reviewing all processes, even diagramming how the college operates, from the perspective of the student.

Reorienting an institution

toward students calls for putting their success over rankings or research.

WEST TEXAS A&M

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Meanwhile, enrollment has diversified. Students from historically underrepresented groups are more likely to go to college than before. And a wave of demographic change is bringing to campuses more Hispanic students and fewer recent high-school graduates over all.

For many institutions, retaining more students has become both a moral and financial imperative. It means not only increased state funding but also enough tuition revenue to balance the budget. Still, raising the average retention rate isn't enough if low-income and minority students lag behind.

To get results, campus leaders have invested in student services and academic supports. They've hired student-success specialists, deans of student success, and assistant vice presidents for strategic student-success initiatives.

In recent years the buzz has only intensified. A proliferation of groups promote student success — Achieving the Dream, Complete College America, the University Innovation Alliance, and Yes We Must, to name a few and the big higher-education associations have taken up the cause. Reports and conferences hailing solutions crowd desks and calendars. The burgeoning ed-tech industry promises silver bullets to motivate students and dashboards to monitor every metric.

And take Georgia State. The previously little-known regional public university has proved that progress is possible. Through a comprehensive approach driven by data, so-called intrusive advising, and small, justin-time retention grants, it has increased its graduation rate by 23 percentage points in 15 years; eliminated racial, ethnic, and socioeconomic disparities; and become a poster child for the movement.

Other campuses have also posted significant gains, among them Arizona State University, the University of South Florida, and Sam Houston State University. Those stories put pressure on peer institutions to shake off mediocrity and recognize the potential of all students.

The common mantra is to move the needle, but sometimes it gets stuck. While student-success courses or summer bridge programs may help orient newcomers, such moves are often too small. Many efforts don't make it past the pilot phase. Grants run out, point people leave. Plenty of institutions run into technical issues collecting data or deploy tools that underdeliver. Some campuses have tried several things, including touted tactics that worked elsewhere, without seeing much impact.

The student-success movement is at a turning point between rhetoric and reality. The problem is vast and complex, the work consuming and slow.

National completion rates are inching up but still haven't cracked 60 percent over all. And some credentials and degrees don't help graduates earn a living. Disparities by race, ethnicity, and income persist. Of the 11 institutions in the University Innovation Alliance dedicated to closing achievement gaps, only two (Georgia State and the University of California at Riverside) have pulled it off so far. What does that mean for campuses without the same commitment of resources?

The student-success movement is at a turning point between rhetoric and reality. The problem is vast and complex, the work consuming and slow. But colleges are reclaiming an agenda initially influenced more by advocates and finding their own paths to change. Community colleges and regional public universities have been at the forefront, trying to make success as much a priority as access, while more selective institutions are seeking to diversify their student bodies and ensure equitable outcomes.

This report offers lessons on where to go from here. It lays out three guiding principles to jump-start student-success efforts or take



Note: Data are for first-time, full-time students seeking credentials who earned them from their initial institutions within 150 percent of the expected time.

 $Source: U.S. \ Department \ of \ Education$

Fig. 2: A FULLER TALLY

Including part-time and transfer students, the National Student Clearinghouse posts more complete – and higher – graduation rates than does the federal government.





Fig. 3: PERSISTENT ACHIEVEMENT GAPS

Eliminating racial, ethnic, and socioeconomic disparities in graduation rates is a prime goal of the student-success movement.



Note: These are 2017 data for first-time, full-time students seeking credentials who earned them from their initial institutions within 150 percent of the expected time. Source: U.S. Department of Education

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them to the next level, identifying pitfalls along the way. And it provides 30 glimpses of campuses across the country to show what it takes to pursue this crucial but challenging work.

Best practices aren't quick fixes.

The pressure to improve student success creates a fixation on solutions. Indeed, some reforms in academic programs and services have made a difference on certain campuses. But numerous lists of best practices tell colleges what to do — not how to do it.

A concept like early intervention, or catching students in time to help, can lose something in translation. An institution may use the term without having rigorously adopted the practice of mining data to find students in need and then designing effective outreach. When he asks campus leaders whether they have intrusive advising, a model of proactive rather than reactive guidance, George L. Mehaffy often listens to their responses unimpressed. "I'm thinking to myself, Dude, this is not intrusive advising," says Mehaffy, vice president for academic leadership and change at the American Association of State Colleges and Universities, which has promoted support for first-year students, among other approaches.

Plenty of people want to persuade themselves and others that they're doing all the right things. And innovators can make it look easy. An administrator who says, Let me use big data like Georgia State to solve our problems here, might ignore the appropriate conditions and infrastructure, never mind the continued investment the practice demands. "Most campuses have no idea what predictive analytics truly is or the work that's required behind the scenes," says Bridget Burns, executive director of

Fig. 4: WHO HEADS TO COLLEGE

Enrollment has changed as more Hispanic and low-income students have started straight out of high school.

Race/Ethnicity



Family income



Note: College-going rates are two-or three-year moving averages of enrollment for people ages 16 to 24 the same year they finished high school or completed a GED.

Source: U.S. Department of Commerce, Census Bureau, Current Population Survey

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the University Innovation Alliance. When high expectations give way to disappointing outcomes, officials may not know why, or what to do next.

Bold pronouncements by advocacy groups heighten the sense of urgency to adopt best practices and scale them to serve all students. "If it works, why aren't you doing it?" says Bruce Vandal, senior vice president at Complete College America, which promotes six game changers, such as creating academic maps of highly structured course

sequences. The message is that the longer you wait, the more students you're leaving behind.

Grants for particular reforms are another incentive. But several years into this movement, some funders realize that they've given money for solutions before fully understanding the context. And researchers say positive results from one or more institutions may not hold for others. "People talk about 'evidence-based practices' when I don't think the evidence they had was very strong," says Thomas Bailey, president of Columbia University's Teachers College and founding director of the Community College Research Center.

One controversial practice is for colleges to urge students to take a full-time course load of 15 credits a semester. Known as "15 to finish," it is based on the fact that part-time students are less likely to graduate and the premise that more could enroll full time. However, the promising outcomes so far are from willing students able to take more credits, whose characteristics and circumstances might have made

them more likely to finish anyway. The push could be detrimental if some take a heavier course load than they can handle.

Of course colleges can't wait for conclusive evidence. They should try new approaches, measure the impact for themselves, make adjustments, and keep monitoring the effects. More research on bringing student-success efforts to scale is needed, administrators and experts said in a recent survey by Ithaka S+R on obstacles to change. Some grants involve evaluation partners,

Fig. 5: WHERE GRAD RATES HAVE RISEN FASTEST



Note: Data are for full-time students seeking credentials who started at the four-year colleges in 2001 and 2011 and the two-year colleges in 2004 and 2014 and completed within 150 percent of the expected time. Colleges with fewer than 100 students in each entering or completing cohort are excluded.

Source: Chronicle analysis of U.S. Department of Education data

Georgia State: a National Model, but Hard to Replicate

n conversations about student success, Georgia State University often comes up. Enrolling a diverse population of more than 50,000 students across metropolitan Atlanta, the regional public institution has posted impressive gains as other campuses strive to do the same.

Leading Georgia State's efforts is Timothy Renick, senior vice president for student success, who as a religious-studies professor there saw class after class of students come in, he says, with the hope, energy, and ability to graduate. But the majority didn't make it, a product of what he calls "benign neglect at best and abject acceptance at worst." In 2003 the graduation rate stood at 32 percent. Renick and two consecutive presidents determined to transform the institution.

At first the work was quiet and lonely, he says: opening a student-success office in 2008, then offering grants to help students who were on track to graduate except for owing modest balances. The university wasn't much different from others, says Renick, it just innovated sooner. And, he adds: "We had data."

As Georgia State keeps applying predictive analytics and adapting its advising and instruction, it presents student success as a science. And it has become a prime example of progress, celebrated by *The New York Times*, President Obama, and Bill Gates. The graduation rate has risen by 23 points, to 55 percent,



Timothy Renick speaks with representatives from other institutions about a study of data-driven advising.

with no gaps by race, ethnicity, or income. Campus leaders from about 250 institutions have flocked there to see an exemplar in action. Now on monthly visiting days, students let guests sit in on their advising sessions. The Lumina Foundation just gave the university a grant to hire an administrator to coordinate tours.

Georgia State has inspired similar institutions but also intimidated them. "They have done a great thing in terms of showing the world what is possible," says Monica Brockmeyer, associate provost for student success at Wayne State University, in Detroit. But how possible has it been for others? "We all traveled down there, and we all learned things, and I think a lot of places were a little discouraged," she says. "It wasn't immediately obvious how to translate back."

The playbook is online, but executing it depends on many factors. With its track record, Georgia State has attracted grants and sustained institutional investment that many colleges cannot match. Campus politics matter, too. A cabinet position and several offices under his control mean Renick can readily direct reforms like the adoption of new technology. A decentralized model is more common, with barriers to communication and consistency. "To make transformative change on a campus and do it by trying to coax and plead and beg other administrators who actually have larger budgets and large staff," he says, "that's a tall order."

Fig. 6: COLLEGES THAT BOOST SOCIAL MOBILITY

New measures show the share of students from low-income backgrounds who go on to achieve high individual earnings.

	Social-mobility rate
CUNY, Bernard M. Baruch College	12.9%
CUNY, City College	11.7%
CUNY, Herbert H. Lehman College	10.3%
California State U. at Los Angeles	9.9%
CUNY, John Jay College of Criminal Justice	9.7%
Pace U.	8.4%
Stony Brook U.	8.4%
CUNY, New York City College of Technology	8.3%
CUNY, Brooklyn College	8.1%
U. of Texas-Pan American (now part of U. of Texas-Rio Grande Valley)	7.6%

Note: The social-mobility rate is the percentage of all students born from 1980-82 whose parents were in the bottom 20 percent for household income, and who had reached the top 20 percent for individual earnings in 2014. Colleges with fewer than 300 students in the average cohort are excluded.

Source: Opportunity Insights, "Mobility Report Cards: The Role of Colleges in Intergenerational Mobility," 2017

and a vendor may tap an individual researcher. Professional associations in fields like institutional research could help match more campuses with scholars in the economics of education, recommends Lindsay Page, an assistant professor of research methodology at the University of Pittsburgh School of Education.

Meanwhile, some campus leaders make moves that don't show up on best-practice lists. Examining an institution's own data and processes can lead to original and maybe more suitable ideas. Pierce College, in Washington State, focuses on course completion, putting that information in the hands of faculty to encourage improvements in teaching. The University of Iowa and Clemson University emphasize meaningful campus jobs. That may not be trendy, but students who work on campus tend to be more likely to graduate.

Think beyond discrete projects to broader issues or systems.

A common approach to student success is "innovation as decoration" — arrayed around the margins of institutions, says Kay McClenney, senior adviser to the president at the American Association of Community Colleges. Boutique programs may produce good outcomes, but for relatively few students. Sometimes the effects are short-lived, perhaps increasing freshman-to-sophomore retention but not graduation rates.

"Collections of discrete initiatives are not going to get us where we need to go," McClenney says. Meanwhile, initiative fatigue can set in, while colleges fail to tackle the underlying issues.

Taking a step back requires listening to the frustrations of people on the front lines — and of students themselves. Institutions far along in this work as well as those newly committed to it can ask, What don't we know yet? What can't we do yet?

As a long-term investment, creating a tool may not prove as sound as improving a system. Austin Peay State University designed Degree Compass several years ago to help students choose courses, in part by predicting their performance. Accurate

and effective, the tool gained attention as an early example of the power of analytics. But it served a limited function and became outdated. Now a bigger priority for the university is building a data system to let faculty and staff members look in on students' progress and enable greater collaboration to support them, says Loretta Griffy, Austin Peay's associate vice president for student-success strategic initiatives.

Developing the capacity to collect, analyze, and apply student data is fundamental to improving student success. Yet few colleges are there yet, having cultivated what is called a culture of evidence. A common early challenge is that people don't want to believe poor results. "You can feel where a college is on their journey based on their acceptance of data," says Karen A. Stout, president of the national nonprofit Achieving the Dream. Once a campus has a reliable picture, unflattering though it

Fig. 7: SIMILAR STUDENTS, BETTER RESULTS

These institutions most significantly outperform their peers in graduating black and Latino students.

Black	Peer differential	Completion gap between black/ white students	Black student graduation rate	Percentage black freshmen
Rutgers UNewark	28.1	2.2	62.7%	14%
U. of California-Riverside	21.1	-1.7	69.5%	8%
U. at Albany	21.0	-1.8	67.2%	9%
Keiser UFt. Lauderdale	18.9	-1.4	49.4%	28%
U. of North Carolina-Greensboro	18.6	-3.0	57.7%	23%

Latino		Peer differential	Completion gap between Latino/ white students	Latino student graduation rate	Percentage Latino in cohort
Whittier C	ollege	20.3	-5.5	71.2%	34%
U. of California-Riv	erside	16.4	2.7	66.4%	32%
U. of South Florida-	lampa	13.1	-0.6	66.2%	17%
U. of F	lorida	12.6	0.8	87.3%	17%

Note: The Education Trust analyzed federal data using three-year weighted averages (2013-15) to identify top-performing institutions with peer differentials of more than 10 percentage points, completion gaps of less than 5 percentage points, and both a minimum number of black or Latino and white students and a minimum share of black or Latino students in the graduation cohorts. Negative completion gaps indicate that black or Latino students have a higher graduation rate than do white students.

Source: The Education Trust, "A Look at Black Student Success" and "A Look at Latino Student Success," 2017

may be, faculty and staff members can start to see structural problems — like when students change their majors too many times — and set about fixing them.

A college with a strong data capacity can identify such patterns, as well as individual students' needs, like tutoring before a midterm or additional financial aid. But most institutional research offices, accustomed to reporting annual figures, are not set up to process information in real time. To do that, many colleges work with a vendor to adopt and tailor a predictive-analytics system. The goal is to enable immediate interventions, whether in person or with messages that build students' confidence by describing challenges as normal and help as readily accessible. That is still an aspiration for many campuses. Less than a third, according to an Educause survey, are expanding toward or already at full deployment of predictive analytics.

Another crucial front in student success is obvious but often neglected: the classroom.

Institutions may track students' attendance or grades but overlook the educational experience. Innovation in teaching and learning should be central to campuses' student-success plans or other efforts will have little effect. "A great teacher with a strong connection to a student makes all the difference," says Sandy Shugart, president of Valencia College, which has

Innovation in teaching and learning should be central to campuses' student-success plans — or other efforts will have little effect. earned national recognition for its outcomes. Still, many campus leaders don't focus on learning, he says. "They're reforming everything except actual instruction."

Like Pierce College, Valencia aims to empower faculty members to develop their own reforms. New instructors go through a robust training process that tests them on teaching practices the college has found effective, especially with minority students. To try to keep improving results, Shugart says, faculty members continually demand more data and experiment with new approaches. For example, the math department recently tested two interventions to increase students' motivation, one promoting the growth mindset, or belief in the ability to get smarter, and the other the utility of the material.

Tracking students' performance by course

and faculty member can be a fraught but important move. The share of F's, formerly seen as inevitable or a sign of rigor, now signals a need for new approaches, especially in high-enrollment gateway courses. Active learning, or instructors' use of group discussion, problem solving, and other activities that require students' participation, is one technique generally associated with higher test scores and pass rates. To engage faculty in the work of student success, campus leaders should consider sharing data and supporting innovation.

Greater gains require organizational change.

Grappling deeply with student success often means confronting institutional obsta-

Fig. 8: INSTITUTIONAL ADOPTION OF STUDENT-SUCCESS TACTICS

Campuswide use, as reported by college IT leaders, is not as common as it may seem.



cles. "There's expanding awareness of how much of the practice of university life has to be re-evaluated," says Monica Brockmeyer, associate provost for student success at Wayne State University.

TOP 3 OBSTACLES TO STUDENT SUCCESS

On a recent survey, administrators and experts pointed to common challenges and opportunities.

Insufficient operating funds provided to public institutions by states

2 Faculty hiring, training, and incentive structures that de-emphasize or discourage improvements in teaching and

student support

3 Administrative silos, which prevent fruitful coordination and collaboration across institutional departments

... TOP 3 SOLUTIONS

Reward faculty for experimentation and innovation around teaching and learning, including taking a research-based approach to their own teaching

Promote more research and evidence on how to bring student-success initiatives to scale

B Develop more robust collaboration across pre-K-12 systems, community colleges, and four-year institutions to streamline students' articulation between systems

Source: "Higher Ed Insights: Results of the Spring 2016 Survey," Ithaka S+R

That can be tricky when improvement is officially one person's job. Few institutions put several offices serving students under a senior administrator for student success who can direct efforts. It's more common to create a solitary new position with relatively little influence.

In 2010, Wayne State drew national notoriety for its graduation rate of less than 10 percent for black students and about 25 percent over all. The university appointed Brockmeyer, a computer scientist, as a "change agent," she says, with a large budget but no staff. She hired dozens of advisers and bought new technology, but beyond that, the initial work was halting and uncertain. She felt like she was in a room talking to herself, she says. One breakthrough: assembling teams from across the campus to diagram how the institution operates, an exercise called process mapping.

It sounds boring, Brockmeyer says, but gathering colleagues to make flow charts of the student experience has tremendous benefits. The registrar's, bursar's, and financial-aid offices, for example, could all align their calendars. Other campuses have visualized the flow of emails students receive, the progression of advising, or the necessary steps before the first day of class. The object is to review everything from the perspective of the student, or in a term borrowed from other fields, the end user.

The exercise often reveals how colleges get in students' way and what to do or stop doing to help. And it can encourage further efforts to smooth students' paths. Evening hours or virtual access for campus services are easy moves. Changing a math requirement from algebra, a common stumbling block, to statistics is harder. But re-examining fixtures like academic programs and the curriculum are necessary to make good on the increasingly popular claim to be a student-centered institution.

The implication is that for decades, supporting students' progress wasn't a priority. On four-year campuses especially, faculty interests took precedence, while two-year colleges focused more on access. Across sectors, layers of bureaucracy accumulated, and the main metric to watch was fall enrollment.

Reorienting an institution toward students is a leadership challenge, and campuses known for reform tend to have a president who prioritizes student success over rank.3

ings or research. Collaboration is also key, whether by putting various student services under the same roof or building cross-functional teams. Temporary action teams can be easier to assemble and more dynamic than long-serving committees.

"Capacity building" and "change management" have become buzzwords in student success, boiling down to a need for more professional development. That's for decision makers as well as the faculty and staff members on the front lines. Some campuses are creating their own training programs or coordinating with peer institutions. Several national groups are expanding technical assistance, as are vendors like InsideTrack, which started coaching students and now devotes more than a third of its business to coaching college employees. Two common struggles it sees are managing resistance to change and designing new incentives and forms of evaluation.

Another model gaining traction is a network of institutions working toward common goals. While established groups like Achieving the Dream and the University Innovation Alliance offer data and leadership coaches or a dedicated fellow, leaders and participants say a lot of the benefit is openly sharing ideas and challenges with colleagues at other institutions. Those relationships last over several Reorienting an institution toward students is a leadership challenge, and campuses known for reform tend to have a president who prioritizes student success over rankings or research.

years, through different phases of student-success work, ideally supporting the organizational change necessary to see progress.

After convening several networks in the last decade, the Bill & Melinda Gates Foundation is trying to help institutions achieve a "continual cycle of evaluation and growth."

WHAT MAKES A GRADUATE THRIVE?

The odds of college graduates thriving are ...

X higher if at least one professor made them excited about learning.

higher if they had a mentor who encouraged them to pursue their goals and dreams. higher if they said professors cared about them as people.

But only 14 Percent of graduates said they experienced all three in college.

Note: The study defines "thriving" as respondents' reporting that they are doing well in five areas: financial, physical, social, community, and purpose. Source: "Great Jobs, Great Lives: The 2014 Gallup-Purdue Index Report"

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.3

Along with the American Institutes for Research, the foundation is building a tool called the institutional transformation assessment initially for its Frontier Set of about 30 colleges and systems, and eventually for anyone. But assessment of student success is apparently as complex as the work itself. Feedback from colleges that tried the tool prompted the foundation to offer additional context for the campus officials answering the questions and to add the response option "I don't know."

Many campus leaders say there's always more to do. "This is a long, hard journey," says Stout, of Achieving the Dream. "You cannot turn student success around in one, two, three, four years." Eight or 10, maybe. Meanwhile, institutions are tracking not only retention and graduation rates, but the leading indicators that should increase first, like pass rates in key courses and credit accumulation in a student's program of study. The idea is to note incremental improvement and keep at it.

When frustrated by institutional obstacles, Brockmeyer recalls her research on the internet, where glitches in networks don't stop it from running. "We're always a little bit broken," she says, "and yet we can make change." romoting access to higher education is grounded in the belief that everyone should get a shot at college. The underlying principle of student success is that everyone should be able to graduate. The old saw "Look to your left, look to your right" reinterpreted for today isn't that one student won't make it but that all of them can.

That includes the 18-year-old who gets a bus to high school and a free lunch there, but doesn't have the same deal a few months later at the local college. And the academically unprepared single parent working two jobs. Many students have a lot to overcome. Colleges are trying to piece together the scaffolding to support them, or at least not stand in their way.

How long will higher education sustain attention to student success? With the financial future and public credibility of so many institutions at stake, it can't be a fad. National concerns about social and racial inequality have only strengthened educators' commitment to the cause. If more students succeed, then college is still an engine of opportunity.

PROFILES

30 Practices in Action



TUDENT SUCCESS is far from straightforward. As the previous section explained, there are no quick fixes to raise retention and graduation rates. Rather than fixate on particular programs or tools, campus leaders should take a step back and tackle broader issues like effective teaching and developing the capacity to collect, analyze, and apply student data. An institution truly grappling with student success will discover that it needs to change the way it's always done things.

Here, in the sections to follow, are profiles of 30 efforts to help students thrive.

This is not a list of best practices. It's a tour around the country offering glimpses inside how different institutions are trying to improve results.

They are at different phases of this work: Some are refining or scaling bold ideas hatched several years ago, and others are newly adapting approaches that seem promising, if more modest. Most are community colleges and regional public universities, which have been at the center of this movement. The profiles are divided into four categories, which represent the main fronts in student success: data and analytics, the educational experience, academic support, and well-being.

ANALYTICS

Building data capacity Updating analytics tools

Data-driven advising

Case-management model

> Analytics certificate for faculty

Finding near-completers




J. INTINTOLI, MTSU

Applying Student Data



UPPORTING STUDENTS starts with understanding them. And they offer many clues, in their backgrounds, academic performance, and behavior. Using that information — demographic factors, grades, even student-ID swipes — to identify broad patterns and individual needs is what's called predictive analytics.

The term is more common than the actual practice, complete with outreach to keep students on track

and procedural changes to smooth their path. Many colleges hit technical snags: For example, different offices run separate software. Deploying a new system can be expensive; training people to use it and cultivating buy-in take time, as do questions of privacy and ethics.

But colleges sit on a lot of data, with many entry points to examine students' experience. The following six examples show efforts to mine that data to improve student success.

TAKEAWAYS

Collecting and analyzing

student data let colleges identify broad patterns and individual needs.

Algorithms that flag

students at risk need continuous tweaks to remain current and accurate.

Cross-functional teams

from offices including financial aid and residence life can help interpret student data.

Effective interventions

require consideration of who reaches out to a student, when, and how.

Sharing data with the faculty can prompt innovations in teaching.

Build Data Capacity on a Budget

THE CHALLENGE

Get and keep a student-data system going despite limited resources.

THE APPROACH

Take advantage of a grant, then restructure departments to incorporate greater use of data.

THE RESULT

Retention rates are steady, and the university is on track to sustain predictive analytics after a grant runs out. oR institutions without much money to spare, using predictive analytics to bolster student success can seem like an expensive pipe dream.

But Delaware State University, a historically black college with just under 5,000 students, got analytics going with a grant and is now reshuffling resources to keep the practice going when the grant runs out.

Delaware State deployed predictive analytics in 2016, with the help of a \$1.2-million award from the Bill & Melinda Gates Foundation. The university is part of the foundation's Frontier Set, a group of 31 institutions working to improve outcomes for

low-income and first-generation students.

The grant money, which allowed Delaware State to hire a chief data scientist, covers about 70 percent of the program's cost for now, says Tony Allen, provost and executive vice president.

But the university is restructuring key departments to incorporate analytics longer term. Most of the changes haven't required big investments, Allen says, but better use of on-campus expertise.

The academic-affairs office, for example, will draw more on data. The University College has become the Office of Student Success, with a new focus on intrusive, or proactive, advising. Rather than wait for students to ask for help, the office contacts those flagged by predictive-analytics software.

Delaware State has also centralized its advising system. Advisers used to be spread out across various colleges; now



DELAWARE STATE U.

An adviser talks with students at Delaware State U., where leaders are using predictive analytics to better identify students' needs.

under one roof, they collaborate on new approaches. Students must meet with their advisers at least twice a semester. "We've been cross-training, so no matter what your major is, that adviser can help you," says Lisa Dunning, associate vice president for academic affairs. "You don't have to get moved around the world to find the right information."

Data gleaned from the analytics program has helped advisers keep students on track. "Last year our retention numbers were a little lower than anticipated, and a lot of it had to do with family circumstances and money," Allen says. So advisers reached out to students and helped at least 25 stay enrolled or return, often by taking online courses or a lighter load.

Over all, Delaware State's efforts are paying off: In the past four years, its retention rate has stayed above 70 percent, compared with an average of 60 percent at historically black colleges and universities.

Update Analytics Tools Constantly

IX years ago, leaders at the University of North Carolina at Greensboro saw that low-income, first-generation students were a rapidly growing segment of their enrollment. Because those groups traditionally lag behind their peers in retention and graduation rates, the university adopted predictive-analytics software to identify students who may need extra support.

The software groups each new class of freshmen into deciles based on their likelihood of staying enrolled. High-school GPA and demographic factors go into the calculations, along with other, less-intuitive information, like how many miles a student lives from home (homesickness can lead some students to drop out).

The university intervenes in a variety of ways. Advisers reach out directly to some students, while others may take part in activities like Spartan StartUp, a new fiveweek summer program. In 2018, it provided 42 new students with individualized advising and mentoring while they earned seven course credits.

One key to Greensboro's success is time spent constantly tweaking its predictive-analytics model, says Dana Dunn, provost and executive vice chancellor. Over time, new data points have been added, including students' pre-university work and their country of origin.

The efforts have paid off: In 2016, Greensboro was recognized in a U.S. Department of Education study for enrolling and graduating Pell Grant recipients at a rate nearly the same as for all students. Some 52 percent graduated within six years, compared with 55 percent over all.

Officials are also revamping their outreach strategies. Until recently, a staff member responsible for first-year retention was the primary point of contact for struggling students. "That was less than productive, because students were getting emails from someone they did not recognize," says Samantha Raynor, assistant vice provost for strategic student success. Now the university is putting together a network of student-outreach representatives that will include faculty members and staff members from offices such as advising, student affairs, and athletics. The goal is for students to hear from someone they already know and trust.

While the information gleaned from predictive analytics is helpful, Dunn stresses that it's only one piece of the puzzle. "We think it has some power," she says, "but we're not relying solely on it." THE CHALLENGE

Help a growing share of low-income and first-generation students stay on the path to graduation.

THE APPROACH

Update predictiveanalytics formulas to reflect new insights, and ensure effective outreach.

THE RESULT

Pell Grant recipients graduate at a rate nearly identical to that of the general student population.



Students work on a poster project about their futures at the U. of North Carolina at Greensboro.

THE TRUTH ABOUT STUDENT SUCCESS

LISSA GOTWALS FOR THE CHRONICLE

Make Advising a Science

THE CHALLENGE

Identify struggling students early.

THE APPROACH

Invest in proactive advising guided by predictiveanalytics software.

THE RESULT

The retention rate for first-year students rose seven percentage points over a fiveyear period, and overall undergraduate retention rose four points. HEN Middle Tennessee State University started using predictive-analytics software in 2014, administrators suddenly had a world of data at their fingertips.

That knowledge was as exhilarating as it was daunting. With so much information, the university has had to choose its priorities carefully. "If we don't, we get spread too thin," says Richard Sluder, vice provost for student success.

MTSU has zeroed in on academic advising, investing in a new infrastructure that puts data in the hands of advisers and encourages a proactive approach. Under the old model, "students came to see advisers to get a check-off to register," Sluder says. "The new model is that advisers are making outreach to students and then paying attention when they're off track."

The university invested \$4 million to restructure advising, bringing on 47 new advisers to more

than double the staff. A three-year grant covered the cost of the analytics software, though administrators had already budgeted for that expense.

Using the software, advisers in each college flag at-risk students by looking at various factors, including performance in 10 general-education courses found to be predictive of success. About 80 percent of students who receive an A in a survey course on U.S. history, for example, go on to graduate, compared with only

40 percent of students who get a D.

Before the use of predictive analytics, a D student might never have come onto an adviser's radar. Now, if students struggle in a key course, "they're going to be set for an alert for an adviser to pay attention to them," Sluder says.

Advisers reach out to students by email, text, and phone. Other outreach tactics have included outfitting cafeteria workers in T-shirts asking "Have you seen your adviser?" and hosting social events at the various colleges' advising centers.

Each center regularly reports its results. The retention rate for first-year students rose to 76 percent in 2018, up from 69 percent in 2012, and the overall undergraduate retention rate rose by four percentage points over the same period. "It's not like, 'work hard and do your best," Sluder says. "We have data and allocated resources, and we're expecting that everybody's doing what they need to do."



At Middle Tennessee State U., advisers use data to help identify students' needs.

Apply Health Care's Case-Management Model



LAURA LYON, U OF SOUTH FLORIDA At the U. of South Florida, staff and faculty members meet to discuss retention efforts, using a case-management model.

N 2015, the University of South Florida's retention and graduation rates had plateaued. With progress stalled for about three years, university leaders brainstormed new ways to keep improving.

Around that time, USF introduced a predictive-analytics platform to flag which students were least likely to persist into the next semester. That's when "the lightbulb went off," says Paul Dosal, vice president for student affairs and student success.

"We would generate these lists, and we'd get maybe 80 students or so," he says. "We can get in touch with them in a hurry. What are we going to do with them?"

Eventually the university realized that there wasn't a single best point of contact for every student. Sometimes the financial-aid department was the best resource; other times it was an academic adviser. In some situations, a knock on the door from an RA was the preferred way to check in. So, borrowing a model used in health-care settings, USF created a case-management team that brings together staff members from departments across campus to stage interventions tailored to each student.

The case-management approach is twofold: On the ground, a team of 12 academic advocates, or case managers, determines which students are most in need, and then either works directly with those students or connects them to other campus departments. Meanwhile, a Retention and Persistence Committee provides strategic guidance. It includes about 20 people from across campus, including residence life, financial aid, academic advising, and the cashier's office.

"Any office that touches the life of an undergraduate student, we try to have them

represented," Dosal says.

Committee members discuss patterns and common stressors they see among the students they serve. Often students who enter the case-management system face crises stemming from the transition to college or family emergencies.

Since adopting the case-management approach in 2016, the university has moved past its plateau, Dosal says: Its six-year graduation rate hit 72 percent in 2018, up from 67 percent in 2015, and freshman-to-sophomore retention is projected to reach 91 percent, up from 88 percent.

To keep things going, South Florida recently developed an in-house communications platform that allows staff members to create a case file for each student and share notes. If a student visits a study-abroad adviser, for example, that person can look at the student's file to get context from, say, the student's recent meeting with a financial-aid counselor.

"When you go to a doctor to get an X-ray, your doctor will have all available information about you," Dosal says. "We're borrowing shamelessly from health care."

THE CHALLENGE

Push past a plateau in retention and graduation rates.

THE APPROACH

Combine predictive analytics with a multidepartmental case-management approach, and intervene when students are most at risk of dropping out.

THE RESULT

In three years, retention and graduation rates have both increased by several percentage points.

Help the Faculty Apply Student Data



CSU

Officials at the California State U. system developed this illustration for a faculty training session on using data to help students succeed.

THE CHALLENGE

Encourage faculty members to use data to engage students.

THE APPROACH

Create a professionaldevelopment program to train the faculty to apply predictive analytics to learning.

THE RESULT

In three years, retention and graduation rates have both increased by several percentage points. A spart of a push to raise graduation rates by 2025, the California State University system is putting data directly in the hands of the faculty. Professors across the system have access to an online dashboard showing student data broken down by campus. The dashboard also allows professors to see achievement gaps in their own courses and track how long it takes their students to graduate.

"Our goal is to not just to show data that make people say, 'Oh, that's interesting," says Jeff Gold, assistant vice chancellor for student-success strategic initiatives. To help translate data into action, Cal State started the Student Success Analytics Certificate Program in 2018 on two campuses, Cal State-East Bay and San Francisco State University. Teams of about 20 faculty and staff members met biweekly for two hours over three months. Aside from in-person meetings to kick off and conclude the program, all sessions were held online.

Although the program provided some training on the dashboard, its chief focus was how participants could use data to support experimentation. Each group submitted a list of proposed projects, which included an analysis of strategies to improve success rates for African-American students and a comparison of nonpassing grades for certain courses online versus in-person.

"They had to apply the data to something meaningful," Gold says.

Early results are promising, he says: Both campuses' groups submitted proposals for changes in pedagogy and student-support infrastructure that could improve grades, retention, time to graduation, and other measures.

The pilot project was backed by a \$484,000 grant from the Stupski Foundation, a philanthropic group serving San Francisco and Hawaii. The Cal State system began rolling out the program on eight more campuses in late 2018. The system picks up travel costs for in-person meetings, but each campus decides how, or whether, to incentivize faculty participation. Some offer stipends, but most rely on personal motivation and interest in analytics, Gold says.

The system has also created awards to recognize faculty leadership in improving student success, and that has helped generate buy-in, says James Minor, senior strategist for academic success and inclusive excellence at Cal State.

Find Former Students Who Almost Made It

HEN THE University of Memphis began recruiting former students in 2011, its efforts mostly fell flat. The university held an open house with admissions specialists, financial-aid advisers, and representatives from different degree programs, with the attitude that "if we build it, they will come," says Tracy Robinson, interim director of the Center for Academic Retention and Enrichment Services.

But, for the most part, former students didn't come.

"We were not really getting the message right," Robinson says. "We needed to ask the students to give us a second chance, as back to campus.

Once students have re-enrolled, they are assigned to one of Finish Line's three full-time advisers, who call themselves "completion concierges." The advisers work closely with students, about 150 to 200 per person, compared with the usual 300 to 400 served by a single departmental adviser, Robinson says. Advisers stay with Finish Line students until graduation, reaching out every two weeks to check up on their progress.

"I've called it 'aggressively friendly,' " Robinson says. "We want to be the person that is pushing them to finish."

The program also provides financial



A U. of Memphis program brings students who dropped out back to campus to complete their degrees.

opposed to us giving the students a second chance."

So in 2013, the university created a program called Finish Line, combining intensive advising with financial support to help people complete their degrees.

To recruit participants, Robinson and her team mine institutional data to identify who might be eligible. They also work with a vendor to locate dropouts and guide them support in the form of completion grants for students who have exhausted their federal financial aid. Memphis pays for the program's overhead and staffing, but the money for completion grants comes from private donations.

Finish Line also allows students to earn credit at a discounted rate for prior learning outside the classroom. A student might pay \$200 to demonstrate knowledge on an exam, for example, compared with \$1,200 in tuition for a regular course.

The intensive advising combined with com-

pletion grants has helped Finish Line succeed where earlier recruiting efforts failed, Robinson says. Since 2013, 526 students have graduated from the program, and 60 more are projected to graduate at the end of 2018.

The program also benefits the university, since Tennessee's outcomes-based funding formula rewards colleges for graduating adult and Pell Grant-eligible students. Many Finish Line participants fall into both categories.

THE CHALLENGE

Help people who dropped out return to earn their degrees.

THE APPROACH

Mine data to identify those close to graduation, and lure them back with scholarships and strong advising.

THE RESULT

Since 2013, more than 500 former students have returned and graduated.

EDUCATIONAL EXPERIENCE

Rethinking remediation

Adaptive courseware

Meta-majors

Cohorts with set sequences

> **Full-time** enrollment

Flexible academic calendar Easing transfer Gen-ed reform Course redesign Inclusive teaching





Improving the Educational Experience

NNOVATION IN TEACHING and learning is vital to engaging students. Yet on some campuses, instruction hasn't changed much over the years, or student-success efforts are focused outside the classroom. Significant gains require re-evaluating the educational experience.

Many colleges are introducing academic technology, encouraging faculty members to try new techniques, or pursuing structural reforms. Remedial education and high-enrollment gateway courses, which too often prove to be stumbling blocks for students, have attracted particular attention, leading to accelerated models and course redesign.

Some campus leaders have rebuilt fixtures like academic programs or the semester calendar.

One key to this work is engaging the faculty, including adjuncts, by sharing data and providing incentives and technical assistance to support improvement. Here are 10 examples of colleges' zeroing in on how students learn.

45

TAKEAWAYS

Progress on student success can go only so far without an intense focus on teaching and learning.

New models for

remedial and gateway courses are increasing students' pass rates.

Creating clearer paths

to a degree may require overhauling academic programs to limit confusion and wandering.

Fixtures like the

academic calendar and the general-education curriculum demand review to serve the contemporary student.

THE TRUTH ABOUT STUDENT SUCCESS

Tailor Remedial and Gateway Courses

THE CHALLENGE

Revamp remedial and gateway courses to improve student performance and meet new state requirements.

THE APPROACH

Use software to teach remedial courses in modules, and redesign gateway courses to be more customized to students' needs.

THE RESULT

Pass rates in remedial and gateway math courses have risen.

IKE MANY institutions in Florida, Indian River State College was thrown off balance when the state legislature passed a bill in 2013 that allowed most community-college students to opt out of remedial courses. The bill also required campuses to submit plans to adopt new strategies for remedial education, such as teaching material in customized modules.

The college had to figure out how to serve students who would be entering gateway, or traditional introductory courses unprepared for

INDIAN RIVER STATE COLLEGE

At Indian River State College, revamped math courses have helped more students earn passing grades.

college-level work, says Heather Belmont, vice president for academic affairs. Math was a particular sticking point for many students there.

Luckily, Indian River had just completed plans to redesign its gateway math courses as part of an accreditation review. More than 60 people on four different teams had worked on the redesign, says Bobbi Cook, the administrator who led the effort.

The college created some gateway courses to be taught in computer labs, where professors give lecture-style instruction before letting students do coursework online at their own pace. It also tailored certain courses to fit students' majors, and created a separate math course for non-STEM students to take instead of algebra.

Since the bill passed, many students have elected to bypass remedial courses and are generally doing well in the new college-level math courses, no less rigorous than before, officials there report. Since the 2012-13 academic year, pass rates for gateway math classes have increased by 23 percentage points, according to the college.

Indian River also redesigned its remedial courses, which now use software that allows students to focus on specific skills they're lacking. After giving a diagnostic test, faculty members create a plan for each student.

And the college began offering remedial math in a repeatable four-week course that condenses the material. If students don't get through in time, they can start again and pick up where they left off. The model saves students money, Belmont says, because they aren't paying for a full, semester-long course up front.

Since 2013, pass rates for developmental math have increased by over five percentage points, according to the college.

The goal for all remedial courses, Belmont says, is to get students ready for college-level work faster. Indian River also eliminated its remedial reading course and moved much of the material into college-level English.

Use Adaptive Courseware in an Interactive Space

PEN FLOOR PLANS make for trendy office layouts these days, but at Austin Community College, educators are also finding the concept conducive to student success. The Texas college bought a shopping mall and turned it into a new campus. The former JCPenney store, with a wide-open space the size of a football field, now houses a computer lab and tutoring center where desks are clustered in groups. When it opened in 2014, the college dubbed it the ACCelerator and started revamping its remedial math courses to take advantage

Students in those courses were having

of the space.

course and get stumped again.

After consulting with other colleges, Austin decided to use adaptive courseware, which lets students test out of topics they've already mastered and move at their own pace. In the ACCelerator, students work at computers while instructors circulate answering questions.

Instructors who see several students struggling with the same concept can pull them together and walk them through it. If others are reluctant to join in, the open space lets them "watch from afar," says Curtiss Stevens, executive director of AC-Celerators at the college. Students have said that being surrounded by others who are ask-

AUSTIN COMMUNITY COLLEGE

Austin Community College's learning center was built in a former JCPenney store.

a *Groundhog Day* experience, says Carolynn Reed, chair of the mathematics department: They'd get stumped at a certain point and either drop out or fail, only to repeat the at different paces can ease isolation and self-doubt, he says. In 2017, Texas passed

ing questions and moving

a law requiring colleges to gradually transition to a corequisite model for remedial education, in which students simultaneously enroll in a college-level course. So the college has already synced the computer-based courses with college-level algebra and is exploring the approach for other courses.

Meanwhile, the ACCelerator also houses tutors and academic coaches, and the courses held there have expanded to other subjects. Students who take a course at the new campus and use the ACCelerator's services at least seven times in a

semester persist in their education at a rate five percentage points higher than those who don't, the college reports. Results are even better, it says, for new students.

THE CHALLENGE

Reverse high failure rates in remedial math.

THE APPROACH

Let students use adaptive courseware alongside one another, with instructors circulating, in a spacious learning center.

THE RESULT

Students who use the space are more likely to continue their studies than those who don't.



Let Students Explore Without Wasting Credits

THE CHALLENGE

Increase the graduation rate and reduce time to degree.

THE APPROACH

Create nine "meta-majors" that let students explore an area of study before choosing a specific major.

THE RESULT

Students are taking fewer unnecessary courses, and the graduation rate has risen by 15 percentage points. N 2011, student success at Lorain County Community College looked bleak: The retention rate was below 60 percent, and the three-year graduation rate stood at 8 percent.

"We had to challenge ourselves to ask: Do our students deserve more?" says Marcia Ballinger, president of the college, in northern Ohio.

It proved to be a pivotal year. The college was awarded a grant as part of the Completion by Design program, supported by the Bill & Melinda Gates Foundation, to improve student success at nine institutions. Over the next five

years, Lorain embarked on a number of reforms, including an ambitious redesign of its degree tracks. For years it had let students choose, cafeteria-style, from more than 120 majors — and from many disparate courses to fulfill requirements,

says Ballinger. In an effort to save students both time and money, the college scrapped that model and instead created degree programs in nine meta-majors, called Program and Career Pathways, such as business and entrepreneurship, education, and health and wellness. The overhaul, which took full effect in the 2015-16 academic year, was influenced by research endorsed by the Completion by Design program.

Now, new students typically enter a meta-major and start taking core courses. They later pick a specific major within that meta-major.

The model allows students to explore a range of programs under a thematic umbrella without wasting credits or taking unnecessary courses, says Jonathan Dryden, provost and vice president for academic and learner services. For example, 9 percent of accounting students were taking anatomy and physiology, considered a tough course, to fulfill a science requirement. Now

"We had to challenge ourselves to ask: Do our students deserve more?"

they are guided toward science courses more relevant to their major. The model also discourages algebra and subsequent courses unless students need them.

So far the results of all Lorain's efforts, including the academic overhaul, are promising. In 2017, the three-year graduation rate rose to 23 percent. .3

Group Students in Career-Focused Cohorts

AKE AREA TECH-NICAL INSTITUTE gauges student success not only by the graduation rate, but also by job placement.

By nearly every quantifiable measure, the Watertown, S.D., community college is effective: Its threeyear graduation rate of 71 percent was the nation's highest for public two-year colleges in 2016, according to a Chronicle analysis, and its retention rate hovers around 80 percent. Some 99 percent of 2017 graduates were employed or continuing their education six months after gradu-



LAKE AREA TECHNICAL INSTITUTE

Students train for law-enforcement careers at Lake Area Technical Institute.

ating, the college reports, and five years out, graduates earn, on average, 27 percent more than other workers in the region, according to the Aspen Institute.

Two keys to its approach are a clear path to a degree and coordination with local industry. From their first day, students enroll in one of 30 programs such as nursing or robotics. Save for a few electives, the college's approximately 2,400 students know every course they will take during their time there.

They move through their chosen programs with a cohort of peers, a feature meant to instill teamwork and encourage retention. If students need remedial coursework, the college fits it in at lunchtime or around other classes so they aren't pulled away from the cohort, says Michael Cartney, Lake Area's president.

And the college has an almost symbiotic relationship with local employers. Each program has an industry advisory board that evaluates the curriculum, companies donate equipment to ensure that students' training is up to date, and some business leaders teach classes, as well as recruit on campus.

The college also encourages faculty members to engage with employers, the president says. "If I'm producing a machinist, then it's my machining instructors that need to understand where the weaknesses are in the program."

Career-driven programs and industry relationships have been a backbone of the college's curriculum for decades, says Cartney. The first step in forming those relationships, he says, is for the president and university leaders to go out into the community and find out what businesses need.

Lake Area's outcomes have earned the college national accolades: It had been a "finalist with distinction" several times for the Aspen Prize for Community College Excellence. In 2017, it finally won.

THE CHALLENGE

Maintain high retention and job-placement levels.

THE APPROACH

Provide degree tracks, place students in academic peer groups, and involve industry leaders at every step.

THE RESULT

The college's graduation and job-placement rates are among the highest in the country for public two-year colleges.

Support More Students to Enroll Full Time

THE CHALLENGE

Help more students stay on track to graduation.

THE APPROACH

Combine financial support with extensive advising, and steadily expand the program.

THE RESULT

Participants graduate at much higher rates than other students do. MONG student-success programs, the City University of New York's Accelerated Study in Associate Programs is arguably one of the gold standards. CUNY started the program in 2007 to help improve graduation rates at the system's seven community colleges. The model "brought together every evidence-based practice that supports students," says Christine Brongniart, the program's interim director.

Those practices include extensive advising and financial support to remove barriers to full-time enrollment. The ASAP program foots the bill for tuition that isn't covered by financial aid, provides bus passes, and helps pay for textbooks. To be eligible, students must be enrolled full-time in an approved major.

"Just the notion of full-time study is off-putting," Brongniart says, when students think it "means you're in class from 9 to 5, Monday through Friday." But course schedules are more flexible than that, and the ASAP program helps students who might feel daunted by pairing them with advisers who manage their progress and guide them toward graduation.

In the program's first few years, its three-year graduation rate more than dou-

bled, Brongniart says. In the past decade, ASAP expanded from its initial cohort of around 1,000 students to 25,000 in 2018.

Scaling up has required rethinking the program's approach. Advisers in particular needed new ways to keep in regular contact with a larger population of students. Under a "triage advisement model," students are sorted into groups based on need, and advisers rely on a variety of tools for keeping in touch, including small-group meetings, online communication, and phone calls.

A bigger program also requires a bigger budget, which is funded in part by New York City. The program costs about \$3,500 per student, and the city has continued to support CUNY as the program has expanded, says Donna Linderman, associate vice chancellor for academic affairs.

CUNY is now working with other colleges to replicate the program's success. Three community colleges in Ohio have adopted their own versions. And the system is bringing ASAP to its four-year colleges, starting with the John Jay College of Criminal Justice in 2015.

"Our goal was to double the four-year graduation rate" on that campus, Linderman says, "and we're fully on track to realize that this academic year."

The City U. of New York's ASAP program includes extensive advising and financial support to help students enroll full time.



CUNY

Adjust the Academic Calendar to Suit Working Students

N 2011, leaders at Odessa College, in Texas, knew they needed to make big changes. Students had been dropping courses at high rates, often to work in the oil and gas industries, and the graduation rate hovered at about 10 percent.

Almost eight years later, Odessa has seen record enrollment and more than doubled its three-year graduation rate. Among other gains, it has closed the graduation gap between Hispanic students, its biggest demographic, and white students.

Odessa credits this turnaround to an allout, top-down commitment to rethinking its procedures. It started by introducing classroom interventions to improve faculty-student engagement, and then, in 2014, it built on that with a critical transformative strategy: It switched from 16-week to eight-week semesters.

At the time, the region was in the middle of an oil boom, with an unemployment rate of less than 3 percent. The region's other community colleges saw major enrollment drops — as much as 27 percent. But Odessa's enrollment grew by 5 percent. "Enrollment has increased to record levels every year since," says Donald Wood, Odessa's vice president for institutional effectiveness.

The eight-week terms made a

difference. "We increased the onramps," says Wood. "Now they had more opportunities to come to college."

Aside from the flexibility, there is another benefit to the shorter term: Students perform better academically. Whereas in 16-week terms they had to juggle three or four courses, in eightweek terms they take only two. More students qualify for Pell Grants because they can take a full-time load over 16 weeks. And when, as Wood says, "life

"Seventy percent of our students are part-time, but with eight-week terms, they can actually graduate in three years."

> happens," the impact isn't as severe. If students drop out in a 16-week term, they lose all credit even if they've made it more than halfway through — and they may have to wait a full year to retake a course. With eight-week terms, there isn't as long a wait.

"Seventy percent of our students are part-time," says Wood, "but with eight-week terms, they can actually graduate in three years."

THE CHALLENGE

Get students to stay enrolled in a region where oil jobs may prompt them to drop out.

THE APPROACH

Re-engineer the traditional 16-week semester into two eight-week terms, and let students focus on fewer courses at a time.

THE RESULT

The three-year graduation rate has more than doubled, and the rate for full-time students is the highest of any community college in the state.

Streamline the Transfer Process

THE CHALLENGE

Improve access to a four-year university, and raise transfer students' graduation rates.

THE APPROACH

Offer guaranteed admission if local community-college students earn an associate degree, and support them in the transition.

THE RESULT

More than twothirds of students in the program graduate in six years, roughly the same rate as for those who start at the university. T THE University of Central Florida, transfers make up nearly half of the student population, and that's no accident. Since 2005, DirectConnect to UCF has guaranteed admission to students who earn a degree from a partnering community college.

From the beginning, the program had logistics on its side. UCF was already offering courses on some community-college campuses, and statewide common course-numbering helped ease the transfer process.

Students who enroll in DirectConnect can live, work, and attend classes close to home, at least for the first two years. They also save about \$6,000 in tuition compared with students who spend four years at Central Florida, and the university ensures that community-college credits transfer.

Some 71 percent of the program's students graduate within six years, a rate nearly identical to that of students who start out at UCF. Over the years, the share of degrees

awarded to DirectConnect students has grown, to 37 percent in 2018, up from 23 percent in 2006.

But there has been room for improvement. In 2017, DirectConnect shifted from academic advising to "success coaching." The university had tried the approach in its online-degree program after identifying a need for students to have a single point of contact, rather than being shuffled around in search of help.

Now DirectConnect students are assigned a UCF coach when they enroll in their community college, and that person stays with them until they earn their bachelor's degree. Previously, students worked with an academic adviser who helped them transfer, but the relationship ended once they enrolled at UCF.

The university shoulders the cost of coaching, which included an initial \$300,000 investment to hire a vendor to train advisers on the approach. Coaches also act as mentors and motivators. "It's much more tied to helping the students make sure they're keeping themselves accountable," says Dale Whittaker, UCF's president. "There's a whole new energy."

The DirectConnect program has diversified the university's student body and increased graduation rates among student populations that historically lagged behind. More than half of participants are eligible for Pell Grants, and nearly one-third are first-generation college students. Of the 47,307 degrees awarded in the program's history, more than 10,000 have gone to Hispanic students.



VALENCIA COLLEGE

With the U. of Central Florida's DirectConnect program, students who earn degrees at partner community colleges are guaranteed admission to the university.

Revamp General Education

HEN AN accrediting agency found that the University of Wisconsin at Oshkosh had not thought out its generaleducation program carefully enough, the institution decided it was time for an overhaul.

The program hadn't been updated since the 1970s, and students didn't understand how general-education requirements fit into their degrees, says Ken Price, director of the current program. In 2007, Oshkosh convened a group to tackle the challenge. Over the next five years, it developed a program it hoped would increase student engagement and raise retention. Called the University Studies Program, or USP, it was approved by

the Faculty Senate in 2012 and took effect the following year.

At the program's core is a trio of courses known as the Quest sequence, which are guided by three "signature questions" relating to cultural competence, community building, and sustainability. The goal, Price says, is to prepare students for careers in modern society.

In the fall of their first year, students take Quest I, limited to 25 students a section. While the subject varies, the content is meant to acclimate students to college, says Debbie Gray Patton, the program's associate director for student success. Students also take a college writing or speech course together, and must attend a certain number of campus events.

Pushing students to go to events enriches their experience in the long run, and can encourage their involvement in a campus organization, says Gray Patton. Meanwhile, the small class size helps professors notice if a student is struggling or not attending regularly, she says.

Quest II, a larger course taken in the second semester, is also offered in various subject areas and aims to get students thinking about academic and career plans. As of 2018, students attend three academic open houses, where they can talk with faculty members in various departments.

To finish off the sequence, in Quest III, sophomores spend about 15 hours doing community-engagement work. As part of a course, for example,

The program is guided by three "signature questions" relating to cultural competence, community building, and sustainability.

they might design a website for a local nonprofit.

Sometimes such work helps students think critically about the future. One group recently worked with elementary schoolers. While some students came away knowing they didn't want to work with children as a career, Gray Patton says, others found that it reinforced a passion for teaching.

THE CHALLENGE

Engage students in general education as a valuable, relevant part of their academic experience.

THE APPROACH

Create small core courses guided by overarching questions and requirements designed to help students think about their future.

THE RESULT

Students are prompted to think about their majors and careers and to get involved in campus and community activities.

Redesign Courses for Student-Centered Learning

THE CHALLENGE

Improve students' academic engagement and performance.

THE APPROACH

Offer 13-week training sessions to help faculty members develop teaching skills and redesign courses.

THE RESULT

More than 300 faculty members have received training, and 581 courses have been redesigned. URDUE UNIVERSITY embarked on an ambitious campuswide effort to improve undergraduate teaching and learning in 2011. The program, called Impact, stands for Instruction Matters: Purdue Academic Course Transformation. It

grew out of the recognition that "the large lecture is not working for the majority of students," says David Nelson, associate director of Purdue's Center for Instructional Excellence, which runs the program.

It is based on developing "autonomy, competence, and relatedness – meaning the connection among students and with faculty," says Chantal Levesque-Bristol, executive director of the center. During a 13-week training program, faculty groups hear from curricular-design and tech experts, study

research on effective learning, and try out new teaching strategies aimed at promoting active learning and other student-centered approaches.

Impact is a largescale effort, with more than 300 faculty members trained so far. First-time participants may receive up to \$10,000 to retool a course. Some 581 courses have been redesigned, and nearly nine out of 10 Purdue undergraduates have taken at least one Impact course.

The results? The courses generally have higher final grades and

fewer students who withdraw.

Students and faculty members report greater satisfaction and more active engagement, and professors also say students who take the courses are more likely to demonstrate critical thinking and problem-solving.

Pamela Karagory, interim head of Purdue's School of Nursing, says 70 percent of nursing courses incorporate Impact goals. "About five years ago, we looked at our curriculum and learners, and reached out to the health-care industry for feedback," she recalls. While Purdue has always aimed to produce clinically competent nurses, she says, the Impact program brings added value to students' nursing careers. A simulation board game called "Friday Night at the ER," for example, prepares students for real-world situations.

Support from campus leaders, the faculty stipends, and — most of all — clear results have all contributed to Impact's success. Karagory says the program has helped



AJ MAS

Purdue U. has focused on improving undergraduate teaching through a 13-week faculty-training program.

students take ownership of the learning process. "Impact has empowered faculty," she says, "but it's really empowered our students."

Train the Faculty to Create Inclusive Classrooms

T. CLOUD, a largely white city in central Minnesota, has a long history of racial tension, and its state college is no exception. From swastikas scrawled on campus buildings to the harassment of Somali students, the college, like the city, has grappled with racism and xenophobia for decades.

In the process, St. Cloud State University has become a model for how to combat racism through education. A program created in

the wake of a federal complaint alleging anti-Semitism by the college now trains 1,000 people each year — students as well as faculty, staff, and community members — in antiracist organizing, advising, and teaching.

Workshops range from a few hours to several days. The most intensive course, "Anti-Racist Pedagogy Across the Curriculum," or Arpac, as it's known, gets professors to confront their own biases and teaches them to create more-inclusive classrooms.

Over the course of five to nine days, participants study systemic racism in higher education, examine their own pedagogy, and redesign a course. They leave with a new syllabus or curriculum to try out. The Arpac project was inspired by a similar course at Minnesota State University at Moorhead.

Since 2009, 113 faculty members and graduate students have taken the course at St. Cloud, including nearly 50 from other colleges. In the first six years, nearly 90 courses were remade. St. Cloud hasn't studied how the course changes affect students, but other research has found that more-inclusive classrooms can improve outcomes for students of color.

Debra Leigh, a professor of dance and



An anti-racism education program developed by St. Cloud State U. provides training for graduate students (above), faculty, staff, and community members.

lead organizer of the university's Community Anti-Racism Education Initiative, says most Ph.D. programs don't prepare professors to teach diverse classes. The workshop, she says, "gives us the opportunity to have critical conversations about race that we may not have had in our preparation." Faculty members who struggle to remake their courses can attend monthly meetings to get support from past participants.

Kyoko Kishimoto, an associate professor of ethnic, gender, and women's studies, says the course taught her to "de-center authority" in the classroom. Now, instead of simply lecturing to her students, she shows them how to facilitate a discussion, then lets them take the lead. Mary Clifford, a professor of criminal-justice studies, starts courses with conversations about the history of racism in crime and punishment.

But not all faculty members are as eager to overhaul their pedagogy: A majority still haven't taken the voluntary seminar. It's not an easy move, Leigh says.

In the workshop, "people realize how their way of working may be complicit with racism," she says. "Coming to terms with that is difficult and, in some cases, traumatic."

THE CHALLENGE

Prevent courses or instructors from inadvertently alienating students.

THE APPROACH

Create intensive workshops in "antiracist pedagogy."

THE RESULT

Dozens of faculty members have revamped their courses to make classrooms more inclusive.

College readiness Family engagement

> Reinventing freshman year

> > Professional advisers

> > > Graduation specialists

Embedded tutoring

Peer mentorship

Online student community





Integrating Academic Support



LITTLE EXTRA HELP can go a long way to raise students' academic performance. The effort could start as early as lifting the ambitions of local children and their parents and encouraging them to prepare for college. Or as late as helping students clear the final hurdles before graduation.

Common approaches center on the transition to college: for example, a bridge program to familiarize new students with campus re-

sources, or a course to teach good study habits. And personalized support comes in different forms: advising, to help students chart a course; tutoring, as closely tied to coursework as possible; mentorship, often by peers who have overcome similar challenges; and coaching, a blend of motivation and guidance.

Making that support accessible, even unavoidable, means reaching more of the students who wouldn't seek it out themselves. These eight examples show efforts to bolster students' progress.

TAKEAWAYS

Integrated support like tutoring and mentorship means more students who wouldn't seek help will get it.

Encouraging local

children and families to aspire to higher education can improve college readiness.

Each stage of the student journey presents its own challenges, like fostering a sense of belonging or removing administrative obstacles to graduation.

Professional advisers

can guide students through the bureaucracy of course planning, while peer tutors or mentors can offer welcome advice and learn themselves in the process.

Raise Expectations Early to Improve College Readiness

THE CHALLENGE

Improve college readiness and create a stronger college-going culture.

THE APPROACH

Provide on-campus experiences for students, starting in elementary school.

THE RESULT

Early interventions have raised the enrollment rates of local students and better prepared them for college. HE LEADERS OF the Long Beach Unified School District, Long Beach City College, and California State University at Long Beach hatched a plan 10 years ago to improve college readiness among local students.

The three institutions had started collaborating even earlier, around the time the Long Beach Naval Shipyard closed, in 1997. As industry was leaving, jobs went with it, and the school district was struggling with high dropout rates, gangs, and crime. To encourage more young people to aspire to higher education, the three institutions, along with the city of Long Beach, formalized an agreement in 2008 called the Long Beach College Promise.

The program guarantees a tuition-free year at the community college and admission to the university after earning an associate degree, but success hinges on much earlier touchpoints with students.

Fourth and fifth graders from Long Beach public schools take tours of the two campuses. In middle school, students and their parents sign a pledge committing to college readiness. And in high school, the school district subsidizes the cost of Advanced Placement exams and allows students to enroll concurrently in credit-bearing college courses at no charge.

Those early interventions have paid off: More than 50,000 elementary schoolers have visited both the community college and university to learn about programs of study and how to pay for them. By middle school, Long Beach students are already thinking about college, according to the Promise group's research, and some even have career paths in mind. In 2017, 65 percent of local high-school graduates were college ready, up from 43 percent in 2008, according to the group's 10-year anniversary report. Since the program began, enrollment of Long Beach public-school students at the Cal State campus is up 71 percent.

The partners share costs to fund the program. During tours for fourth and fifth graders, for example, the school district pays for busing and transportation, and the college and university pick up campus expenses.

Fourth and fifth graders from local public schools take tours of the community college and university.

"We don't bill each other," says Terri Carbaugh, a Cal State Long Beach spokeswoman. "We tend to say yes to good ideas, and then internally we expect each institution to come up with the resources."

Help Immigrant Parents Advocate for Their Kids

N THE MID-2000s, Phoenix was in the midst of a population boom that would increase the city's Latino population by 31 percent over a decade. At nearby Arizona State University, campus leaders were searching for ways to recruit more members of this important demographic group. So when an administrator heard about a California program that was teaching immigrant parents how to help their children enroll in college, the university decided to copy it.

And the second second

A man receives his graduation certificate from Arizona State U.'s American Dream Academy, which teaches parents how to help their first-generation students prepare for college.

In the fall of 2006, ASU offered its eight-week American Dream Academy in two Phoenix-area schools. Some 250 parents graduated.

The course seemed scalable, but the administrative work was daunting, and expanding to more schools would drive up the cost.

To grow, the program would have to become more efficient. So the university built software that automated the back-office functions, using a \$3-million grant from the Helios Education Foundation. Today the academy graduates close to 4,000 parents and their children from 80 elementary and secondary schools each year, "and it doesn't feel overwhelming," says Alejandro Perilla, the longtime director.

The program, which costs just over \$1 million a year, gets half its funding from Arizona State and the remainder from local foundations and participating schools, which pay \$7,500 apiece. It is offered free to families.

Research shows that a majority of low-income and minority parents want their kids to attend college. Yet many parents of first-generation students aren't sure what it takes to be effective advocates for their children. Meanwhile, most college-access programs focus on the student as a way to make up for gaps in the parents' knowledge.

The American Dream Academy aims to bridge those gaps, giving parents the information and confidence they need to help their children succeed, while not-too-subtly selling them on an Arizona State education. In recent years, 80 percent of the children of academy graduates who were seniors in high school went on to college — twice the rate of Arizona students generally — and a fifth went to ASU.

What Arizona State doesn't yet know is if they're graduating at higher rates than their peers. That's partly due to federal privacy laws, which complicate tracking students beyond the program's end.

Recently the academy began branching out to more rural parts of the state, including the border town of Yuma, where 542 parents enrolled in the fall of 2018.

"There's just this huge hunger from parents to help their kids find the American dream," Perilla says.

THE CHALLENGE

Help parents of first-generation students prepare them for college.

THE APPROACH

Set up an academy to teach immigrant parents to advocate for their children and navigate the process of applying for college and student aid.

THE RESULT

Eighty percent of high-school seniors whose parents graduated from the academy go on to college.

Reinvent the First-Year Experience

THE CHALLENGE

Stem a worrisome slide in first-year retention.

THE APPROACH

Start from scratch, fostering relationships and a sense of belonging on campus

THE RESULT

After just three years, the university's firstto-second-year retention is up nine percentage points. HEN THE FRESHMAN retention rate at Southern Utah University fell five percentage points in five years, college leaders knew they had a problem. They just weren't sure what to do about it.

The college had tried several "high impact" practices that are supposed to help with retention, but they weren't stemming the slide.

At a loss for solutions, administrators hired a chief retention officer, Jared Tippets, who had been the director of student success at Purdue University. Tippets, whose formal title is vice president for student affairs, started from scratch with his team, building students arrive on campus, they're given a choice between boisterous welcome parties and more intimate gatherings. Peer mentors offer to take students to their first club meeting so they don't have to go alone.

New students complete a questionnaire that asks about their financial, emotional, and social well-being before the semester starts, and again three weeks in. When a student shows signs of struggle, an adviser, faculty member, or peer mentor will intervene.

As with most major overhauls, there was some initial pushback. Faculty members, Tippets says, didn't always appreciate being told how to help their students. So administrators stopped telling them to send a specific



Meanwhile, the college continues to innovate, aiming for a retention rate of 75 percent. To generate new ideas, it hosts a "shark tank" competition, inviting anyone to present a proposal for improving retention to the president's council. The contest has led to the creation of a peer-mentoring program and the hiring of a "withdrawal coordinator" who looks for ways to keep would-be



KIM RAFF FOR THE CHRONICLE Incoming freshmen and their parents can visit with current students at Southern Utah U.

a comprehensive "first-year experience" that focused on fostering a sense of belonging.

The overhaul worked. First-to-secondyear retention has risen nearly nine percentage points over three years, reaching 73 percent in 2018. In the process, the college has saved over \$5 million in tuition revenue from students who stayed enrolled.

Under the new approach, advisers and peer mentors reach out to students an average of 38 times from when they pay their admission deposit to when they move in. When dropouts enrolled.

Other changes have been driven by data. After surveys showed that students were continuing to leave for financial reasons, the college hired a financial-literacy expert. And when personality assessments revealed an uptick in introverts, it added more small-group sessions to welcome week.

"Welcome weeks are notoriously programmed for extroverts," Tippets said. "A lot of our students struggle in those environments."

Charge Professional Advisers With Course Planning and Navigation

HEN THE economy took a nose dive in 2008, administrators at Florida International University started asking themselves hard questions: What could they do to ensure students got a better return on their investment? And how could the university spend its money more strategically?

While more than 80 percent of first-year students were returning, the four-year graduation rate around that time was barely 20 percent. FIU serves a diverse popu-

lation: Almost 70 percent of its nearly 48,000 undergraduate students are Latino, and almost 50 percent are Pell Grant recipients.

In 2009, FIU made a decision to shift from faculty to professional advising. It already had about 25 professional advisers, but needed more, says Charlie Andrews, assistant vice president for academic and career success. So the university committed to adding 12 positions each year for the next three years.

Professional advisers, as FIU defines them, hold a master's degree in a subject area or a field like counseling. Their main role is to guide students through the bureaucracy of course planning, a process that often trips students up and saps energy from faculty advisers. Professional advisers also reach out to students who are struggling academically.

While the primary motivation for adding advisers was to promote student success, there was a financial angle as well: By 2009, the university could see that Florida was going to become an outcomes-based funding



Florida International U. has hired dozens of professional advisers to help improve retention and graduation rates.

state, Andrews says. And higher retention rates would mean more tuition money flowing to the university anyway.

Still, adding so many new positions in a three-year period presented a significant cost. Elizabeth Bejar, senior vice president for academic and student affairs, says the provost and chief financial officer decided to allocate university funds as a long-term investment.

The investment ballooned: Since 2009, FIU has added about 90 professional advisers, bringing the total to approximately 120. Each adviser has a caseload of about 400 undergraduates, which the university hopes eventually to pare down to 300. Meanwhile, the use of professional advisers allows faculty members to focus more on teaching and mentoring students, boosting their performance, Andrews says.

Since 2008, FIU's four-year graduation rate has risen by 15 percentage points, according to the university, and full-time student retention has increased by six percentage points, to 88 percent.

THE CHALLENGE

Help students sequence the courses they need for a degree.

THE APPROACH

Hire about 90 professional advisers.

THE RESULT

Retention and graduation rates are both on the rise.

Get Students Across the Finish Line

THE CHALLENGE

Support students near graduation through that final stretch.

THE APPROACH

Create "graduation specialist" positions focused solely on barriers to graduation.

THE RESULT

The university's four-year graduation rate has risen almost four percentage points since the program started. HEN Indiana State University's retention rate slipped by nearly 6 percentage points in 2010, the institution sharpened its focus on student success. Administrators explored ways to help new students, while considering how to propel more juniors and seniors to the finish. The university's four-year graduation rate had hovered around 20 percent for at least a decade.

About half of Indiana State's students are first-generation, and about two-thirds receive financial aid. After examining data and talking with advisers, administrators identified common challenges juniors and seniors were facing, such as scheduling problems and not being offered. Or students didn't know where to get help with course planning and felt abandoned.

She encountered pushback at first, she says: "It was hard to get buy-in," especially from academic advisers, and from faculty members who felt like she was meddling.

The university now employs three graduation specialists, who pore over student records, trying to catch gaps in degree progress or other inconsistencies, and act as a one-stop shop for students' questions. They also contact students who have left without finishing their degrees.

The specialists cross-train with the university's financial-aid office. Scholarships



Indiana State U. has created a new role, the "graduation specialist,"

to help students plan their classes and overcome obstacles to getting

can depend on students' earning a certain number of credit hours each semester or year, and for students who work, those targets can be difficult to achieve. The specialists are a first contact for students struggling to maintain their scholarships, and the university has reserved aid for students whose credit hours fall just short.

Indiana State's fouryear graduation rate has risen almost four percentage points since 2016, continuing an upward trend in the past several years. While the jump cannot be

financial barriers, says Joshua Powers, associate vice president for student success.

a degree.

Inspired by a program at California State University at Fullerton, Indiana State created a "graduation specialist" role in the 2015-16 academic year. Christina Cantrell, the first one, was quickly able to see a lot of "balls being dropped," she says, like prerequisites attributed solely to the specialists, their role has been an important factor, Powers says.

JONATHAN GARCIA, INDIANA STATE U.

Cantrell often hears from graduates who may not have earned their degrees without that additional support in the home stretch. "I get lots of emails from students just thanking me for giving them, you know, a little bit of extra time," she says.

Take the Writing Center to Class

TUDENTS who seek out the Norman H. Ott Memorial Writing Center at Marquette University have tended to self-select, making appointments on their own initiative. In the spring of 2015, Rebecca S. Nowacek, the center's director and an associate professor of English, decided to cast a wider net. "We wanted to be more directly and aggressively building relationships with writers and faculty we weren't seeing otherwise," says Nowacek, "instead of waiting for writers to come to us."

So she started the pilot Course Embedded Tutors (CET) program, in which undergraduates trained as writing tutors are placed in courses in the humanities and other subjects, such as investment banking and physics. Since then, 35 tutors have worked with students in 36 courses. All tutors must go through a competitive application process, take a for-credit class on tutoring taught by Nowacek, and participate in three tutoring workshops.

The tutors then meet with the faculty member teaching the course to discuss assignment goals and anticipate common writing challenges. Two weeks before a paper is due, tutors collect drafts, return them to students with comments, and hold one-on-one conferences. The instructor receives organizing, and revising are critical components of high-quality work.

Students find the face-to-face peer relationships helpful. "I could ask my CET stylistic or structural questions that seemed superfluous to ask my professor," says Corrine Conway, a senior who worked with a tutor in a cultural-anthropology class.

Because the tutors have not taken the course themselves, they focus strictly on helping students write. Now a tutor, Conway recalls being "terrified" when given her first papers to read, in an electrical-engineering course. "I don't know how circuits work!" she says. "But as long as we can understand what the students are being asked, we can help them with it."

Writing tutors receive a stipend for their work, and the program is funded primarily and at times, solely — by the writing center. In late 2015, the program won an internal innovation grant. Based on campus feedback, Nowacek expects the program to thrive. She

"We wanted to be more directly and aggressively building relationships with writers and faculty we weren't seeing otherwise, instead of waiting for writers to come to us."

both the early version of the paper with the tutor's comments and the revised version.

The goal is not "a pile of A papers," says Nowacek, but rather to convey that planning, estimates that embedded tutoring has helped hundreds of students in the past three years. "We really want to be a writing center that serves the entire university," she says.



Help students who aren't coming to the writing center improve their writing skills.

THE APPROACH

Create a program that embeds student tutors in courses across several disciplines.

THE RESULT

The writing center has expanded its reach by roughly 20 percent.

Empower Students to Counsel Their Peers

THE CHALLENGE

Encourage students who are struggling personally or academically to seek help.

THE APPROACH

Train student mentors, pay them, and make them easily accessible, alongside their peers in class.

THE RESULT

Students in courses with peer mentors tend to perform better, and mentors gain a greater sense of empowerment. N THE FALL of 2017, a student told Anyssa Manuel that he was falling behind in his remedial-math class. His mother was struggling with a drug problem, and he'd been preoccupied, he said. He felt comfortable opening up to Manuel because she was a fellow student at Phoenix College, part of Arizona's Maricopa Community Colleges system.

Manuel was also a peer mentor at the time. Peer mentors, whom the college calls success specialists, are usually current students assigned to courses in which they have excelled.

Robin Ozz, director of developmental education and innovation at Phoenix, started the program in 2008 after learning about peer-mentoring groups at a conference. Many Phoenix students were struggling in remedial courses, and she thought students were more likely to seek help if mentors were on hand.

She was also inspired by her own experience as a Ph.D. student; she was much more likely to text a classmate for help than to approach a professor.

In class, the peer mentors model appropriate behavior, help with activities, and give presentations on success strategies like note taking. They also hold office hours. While they aren't counselors, they listen to peers' academic and personal struggles and point them toward resources that might help.

Before the semester starts, peer mentors receive about 10 hours of training. They also attend additional training sessions during the semester, and Ozz and her colleagues periodically observe and evaluate them. The positions pay minimum wage and are funded through a federal grant, departmental budgets, and the work-study program. The college employs about 24 success specialists and, despite some ups and downs in the past several years, hopes to grow to 36, Ozz says.

For now, some courses have sections with peer mentors and others without. The percentage of students enrolled at the start of the course who go on to earn a C or better is, on average, higher with the extra help. In one course, the difference was almost 13 percentage points.

Ozz says the program also empowers the mentors themselves at an institution where nearly 75 percent of students are first-generation.

"A lot of times our students are patronized, and that's not a comfortable feeling," Ozz says. "But they're leaders now. They're giving to other people and showing them the way."



DAVID WALLACE

At Phoenix College, student mentors are trained to help their peers with academic and personal challenges.

Offer Online Learners More Personalized Contact



GREAT PLAINS IDEA

or online learners, communication with faculty and staff members can be hit or miss. Important messages often take the form of an email, which can be shuffled into a spam folder or mistakenly overlooked. And more generally the relationships can feel transactional.

Improving that communication is a goal for the Great Plains Interactive Distance Education Alliance, known as Great Plains IDEA, a consortium of 19 public universities that offers online degrees in human sciences and agriculture. Since its students take classes from different institutions, they receive emails from addresses they may not Great Plains IDEA, a consortium of public universities that offers online degrees, is trying new ways to communicate with students like Andrew Carl, a park ranger.

recognize, and they don't always respond to time-sensitive information, says Rachel Ohmes, who oversees all campus coordinators in the consortium.

Ohmes, who also serves as campus coordinator at Kansas State University, found inspiration from her daughter's school, where the teacher used an app called Remind to communicate with parents. The app allows users to share documents and send reminder text messages, and Ohmes plans to try it out with her students and present results to her colleagues at other institutions.

Meanwhile, the consortium also wants to make sure its members take steps to minimize the impersonal nature of distance learning. Campus coordinators have postcards to send to students (via regular mail) to congratulate them for a project or encourage them during a rough patch. "They get to see your handwriting and think, 'Hey, they're actually thinking of me," Ohmes says.

Great Plains IDEA is also surveying students to determine how best to communicate with them. And some member institutions are trying their own tactics to build community outside of the courses themselves. At Michigan State University, for example, the campus coordinator holds live video-chat sessions to answer students' questions before the semester starts.

"That just helps students understand that we're not just here on the other side of a computer," Ohmes says. "We're real humans, and we're empathetic, and we're ready to help you, whatever that looks like."

THE CHALLENGE

Communicate more effectively with online students outside of class.

THE APPROACH

Conduct surveys, try an app or video chat, and mail students occasional postcards.

THE RESULT

A consortium of universities is experimenting to find the most helpful approaches.



WELL-BEING

First-generation student support Campus jobs Apprenticeships Emergency aid Social safety net Opioid addiction recovery



Promoting Students' Well-Being



TUDENTS ARE PEOPLE, and plenty of their challenges aren't academic. When they drop out, sometimes it's because they were drifting, without clear goals. Or life got in the way. Now campuses are trying harder to engage students and building in more support.

Some programs offer mentorship, advising, and other resources to groups that may

face particular hardships or wonder if they belong in college, like first-generation or underrepresented-minority students, veterans, or single parents. Greater awareness of food and housing insecurity has prompted institutions to set up food pantries and emergency-aid funds and help students apply for public benefits.

A recent trend in campus hiring is a new appreciation for social-work experience. And an emerging consensus is that showing students a path to a career keeps them going. Here are six examples of colleges' promoting students' well-being.

TAKEAWAYS

Many students have

a lot to overcome, and colleges are trying to piece together the scaffolding to support them.

Beyond financial aid,

modest sums to cover groceries, medical bills, or tuition balances can help keep students enrolled.

Career development

in the form of job experience motivates students and prepares them for life after graduation.

To understand and meet students' needs, surveys, focus groups, and frank discussion of challenges are crucial.

Help First-Generation Students Thrive

THE CHALLENGE

Provide low-income and first-generation students the support to make ends meet and feel like they belong in college.

THE APPROACH

Develop a program that provides social and financial resources, mentorships, and career development.

THE RESULT

The students feel supported and valued, and graduate at slightly higher than the average rate.



Students participate in a team-building activity as part of the Georgetown Scholarship Program, which provides support for low-income and first-generation students.

GEORGETOWN U.

HEN CHRIS FISK was admitted to Georgetown University, he was ecstatic. A Miami native, Fisk grew up in a low-income household with his mother and grandmother, neither of whom had attended college. The transition into his freshman year was a shock.

When he arrived at Georgetown, in 2013, Fisk found himself surrounded by peers who seemed to have much stronger social connections and finances than he did, he says.

But the Georgetown Scholarship Program, founded in 2004 to provide financial and social support, as well as career development to low-income and first-generation students, helped him close some of those gaps. A scholarship awarded at admission serves as a "passport" into the program, but its services and resources are open to anyone, says Missy Foy, the program's director. Today it serves more than 650 undergraduates.

Though Georgetown meets all demonstrated financial need of the students it admits, the program helps them with expenses that can pop up around the margins. Its "necessity fund" provides money for groceries, a winter coat, or medical bills. It can also pay for students to travel home and offers a place to stay if they don't have a stable living situation.

Beyond money, the program aims to help students like Fisk feel like they belong on a campus where many classmates are more affluent. For example, if a student's family can't come on move-in day, local alumni will show up at the airport, clad in Georgetown apparel, to greet the student and help set up his or her dorm room. The program also matches students with alumni and peer mentors and gives them career resources.

The program is funded by the university, but several efforts, like the necessity fund, are supported solely by donations, Foy says. Many ideas come from the students themselves, she says, and Fisk describes that as the heart of the program's success.

Fisk, who served on the program's student board, says the program gave him the support he needed to be proud of his background and to thrive. By senior year, he was vice president of the university's student body.

The program helps students all the way through to graduation, and 96 percent of them finish in six years, a rate slightly above that for all students.

Develop Meaningful Campus Jobs

N THE SUMMER OF 2011, Clemson University's then-provost, Doris R. Helms, came up with an idea she thought would increase student engagement and improve graduates' employment prospects: offering paid, on-campus, professional internships. She pitched the program to Neil Burton, executive director of Clemson's Center for Career and Professional Development, saying it would be a way for students to try out careers and earn a little income, too.

Burton was sold. "How many are you thinking?" he asked, expecting an answer of 25 or 50, he recalls.

"Five hundred," she replied.

"I was a little taken aback," recalls Burton, whom Helms charged with making her idea a reality. When he estimated that it would cost almost a million dollars to start the program, Helms told him to go bigger. He tripled the request.

Some faculty members and administrators were less enthusiastic. Barely six months earlier, Helms had asked department heads to shave 20 percent from their budgets, and many feared deeper cuts ahead, Burton says.

But the university had made student engagement a key pillar of its strategic plan, and the president's council agreed to the request. The program started the following spring with 20 students, aiming for 500 by 2020.

In 2013, when there were 120 interns, state legislators offered to kick in \$1 million if the program got to 620 interns by 2014. It made the target, hiring 626 students that year.

Today the University Professional Internship and Co-op program, or UPIC, employs close

Clemson U. has developed paid internships, including this geomapping project using drones, for hundreds of students. to 1,000 students, who help redesign campus websites, visit local high schools to discuss college admissions, and perform other campus jobs. There are 20 applicants for every position.

UPIC provides financial incentives to faculty and staff members to create skilled campus jobs for students, covering half of their salaries. It sweetens the deal for employers who hire needier students, covering a full semester's salary for Pell Grant-eligible, first-generation students from South Carolina.

Clemson didn't design its program with equity as a major goal, but Burton says he knows of several low-income students who persisted to graduation because they were paid to work on campus. Of the 299 students in the program's 2012 cohort, 291 — more than 97 percent — graduated within six years.

The program seems to be helping students land jobs, too. In its latest graduate survey, Clemson found that those who participated in UPIC were significantly more likely to be employed full time than those who didn't pursue any form of experiential education — 68 percent versus 46 percent.

THE CHALLENGE

Prepare students from all economic backgrounds for rewarding careers.

THE APPROACH

Create a program offering paid, professional internships in a variety of campus roles.

THE RESULT

Students who participate are more likely than their peers to be employed full time after graduation.



CLEMSON U

Build Apprenticeships With Local Employers



THE CHALLENGE

Prepare students for high-demand jobs.

THE APPROACH

Develop your own white-collar apprenticeship programs.

THE RESULT

Harper College has established eight new programs, with an 82-percent completion rate overall.

HARPER COLLEGE

ARPER COLLEGE became a national leader in white-collar apprenticeship programs rather quickly.

Just five years ago, most in the community-college world associated apprenticeships with unions and blue-collar jobs like construction, says Rebecca Lake, Harper's dean of work-force and economic development.

Then, around 2013, the Obama administration began a drive to "double and diversify" apprenticeships, bringing the "earn while you learn" model to more industries and to more women and minorities. In 2014, the Department of Labor announced \$100 million in grants to expand apprenticeships into highgrowth white-collar fields.

Zurich North America, which was having trouble finding claims adjusters and underwriters to work at its North American headquarters, located outside Chicago, asked the nearby college to be its partner on a grant proposal. Students would study at Harper and get on-the-job training at Zurich. The college agreed, and the first U.S. apprenticeship for the insurance industry was born.

But Harper didn't stop there. Lake wanted the college to design and run its own A former Harper College student works at the insurance company Zurich North America after completing an apprenticeship through the college.

apprenticeships, so she applied to become a federally recognized "program sponsor," and got a \$2.5-million grant to develop Harper's programs.

Today, Harper offers eight apprenticeship programs in fields as diverse as graphic arts and cybersecurity, educating employees for 44 Chicago-area companies. Recently the college hosted a national conference to share its expertise.

Academically, Harper's appren-

tices are outperforming their peers. Their average GPA is 3.6, and 82 percent finish their program, earning an associate degree — a much higher completion rate than the college's overall three-year graduation-and-transfer rate of 55 percent. Students are paid to work, and they don't have to borrow. Lake calls apprenticeship a "winwin-win."

"We improve completion rates, companies get a talent pipeline, and students get a job from Day 1, with zero debt," she says.

Harper charges companies between \$15,000 and \$18,000 per apprentice to participate in the program, a cost that covers tuition, fees, and books, as well as coaching for students and training for the employer's mentors.

The federal grant pays salaries for three full-time and six part-time employees, but Lake says the program brings in enough revenue that it will be almost sustainable when the grant expires, in 2020 (the college would just have to cover salaries for two of the jobs).

Lake's advice to colleges that want to create apprenticeship programs: Invest in marketing and customize existing programs, rather than creating new ones. "Faculty don't want to reinvent the wheel," she says.

Give Students a Financial Safety Net

N 2013, administrators at Dillard University came to a surprising realization.

They'd assumed that students who dropped out of the historically black institution in New Orleans did so because they were struggling academically or weren't happy, says Marc Barnes, vice president for institutional advancement. But after digging into data, they discovered that many of the students had unpaid balances. Almost 75 percent of the college's nearly 1,300 students receive Pell Grants, and nearly 95 percent are on financial aid.

The unpaid balances — for tuition or other fees — were typically modest, ranging between \$1,500 and \$2,500, Barnes says. The college resolved to help students who were at risk for financial reasons.

When Dillard sent an email to alumni, they donated over \$500,000 in just a few months. After doling out grants to students in need, Barnes says, the university saw its retention rate inch up and decided to expand the effort. The SAFE fund was born.

Now in its sixth year, the fund, Student Assistance for Financial Emergencies, is a backstop for students who have exhausted all other means of financial assistance. They must apply to be considered, and some are prompted to do so by the financial-aid office.

Students can apply at any point in the semester if they can't keep up with payments, says Kimberly Woodard, Dillard's director of development. If the financial-aid office determines that a student has contributed as much as possible and utilized all other forms of aid, it can award the student a grant at the semester's end. Students with outstanding balances cannot enroll for the next semester.

To date, SAFE has provided over 750

Aziz Muhammad, a physics major at Dillard U., was able to graduate in 2018 with help from the university's special fund for financial emergencies. awards. It is completely funded by donations from alumni, trustees, and other community members, including local foundations, Barnes says.

One challenge with such a fund is that students can begin to rely on it, Barnes says. After encountering that attitude early on, Dillard attached stipulations to the awards. SAFE recipients must take a financial-literacy class and attend a campus event, like a lecture, so they have "skin in the game," says Barnes. The college also stresses that future grants are never guaranteed.

"We have a lot of stories of students who would have dropped out of school had they not received this funding," Barnes says. The data reflect the anecdotes: Since the fund began in 2013, the college's six-year graduation rate has risen to 42 percent, up from 31 percent.



THE CHALLENGE

Stop students from dropping out because of unpaid balances they owe the university.

THE APPROACH

Create a fund that awards students who have exhausted other aid small grants to pay their balances.

THE RESULT

The university's graduation rate has risen by 11 percentage points, as more students facing financial challenges are able to stay enrolled.

Tackle Poverty With a Culture of Caring

As part of an effort to keep low-income students enrolled, Amarillo College offers a food pantry as well as a legal-aid clinic and low-cost day care.

THE CHALLENGE

Give students the financial security to stay enrolled.

THE APPROACH

Tackle poverty from every angle possible.

THE RESULT

Graduation rates have more than doubled over five years. MARILLO COLLEGE wanted to know, back in 2011, why so many students were dropping out of the two-year, 10,000-student institution in the Texas panhandle. So Russell Lowery-Hart, then the college's vice president for academic affairs, decided to ask them.

What students told him in surveys and focus groups surprised Lowery-Hart, who became Amarillo's president in 2014. He'd expected students to blame the teaching or inadequate academic support, but their top reasons for leaving had nothing to do with academics. Instead they cited personal financial challenges like unreliable transportation, unaffordable child care, and needing to put food on the table.

"I was stunned by the response," says Lowery-Hart, who immediately began to research ways to help students "living in the war zone of poverty."

The result is one of the most comprehensive poverty-mitigation programs in place on a community-college campus today. Many colleges offer food pantries or emergency aid, but Amarillo College goes well beyond the basics, offering free mental-health counseling, a legal-aid clinic, and low-cost day care. Case workers coach students through crises and connect them to community and government programs that offer food stamps and cash assistance.

Not everything has paid off. The college is still struggling with transportation problems: An effort to create a student ride-sharing service fell flat, and few students purchased the discounted bus passes the college offered.

But the broader approach appears to be working. In 2013, the three-year completion or transfer rate

for first-time, full-time students was 19 percent. Today it's up to 48 percent.

AMARILLO COLLEGE

Demographically, Amarillo looks a lot like community colleges nationwide. Its student body is older, more diverse, and poorer than at most four-year colleges. More than 70 percent of students are the first in their family to attend and 43 percent are Latino.

The Amarillo College Foundation provided \$60,000 in emergency aid last year to help students cover utility bills, rent, or tuition shortfalls. AutoInc, a local car dealer, donated \$75,000 to tackle hunger, and an anonymous donor gave \$50,000 to help students in need of better housing. Taken together, philanthropy and the foundation cover 60 percent of the \$300,000 annual cost of Amarillo's poverty-reduction efforts.

Most two-year colleges don't have Amarillo's \$43-million foundation, or such generous neighbors. Still, Amarillo believes its approach can be adapted if colleges take the long view.

"We have improved our bottom line because we've increased retention and completion," Lowery-Hart says. "It actually makes financial sense for colleges to engage in this work."


Support Students Recovering From Addiction

NE SUMMER DAY, Dennis F. King, the president of Asheville-Buncombe Technical Community College, got some terrible news: A student had died on campus of a drug overdose. Stuart Moseley had struggled with opioid addiction for over a decade but had been in recovery when, behind a locked bathroom door, his addiction overcame him in July 2017.

The national opioid epidemic has hit the North Carolina college hard: Officials say up to 37 students have died from overdoses since 2012, and an unknown number of addicts have dropped out. Moseley's death on the campus served as a turning point in how administrators thought about addiction and student success. "The days of saying the community college doesn't have a responsibility for the well-being of its students is over," King told *The Chronicle*.

Immediately, A-B Tech took steps to make sure it could better handle an overdose. It applied for grant money to equip its police with overdose-reversal drugs and started a campuswide conversation about addiction. Moseley's mother, Anne Seaman, filmed a video about her son's dependence on drugs, which is now played in every firstyear classroom, often prompting students to share their own stories. A series of public talks focused on the science and experience of addiction.

The college also created a dedicated room for students who are in recovery or want to be. Dubbed the Reset, it's meant to ease their isolation. A faculty member or volunteer is always present in the room. Anne Seaman and her family donated furniture, and a local rehab center provided a coffee maker. To respect students' privacy, professors can discreetly hand them a card showing the room's location.

Since the Reset opened in the fall of 2018, a handful of students visit regularly, and others stop in on occasion, says Heather Pack, director of student-support services. "Everyone seems really appreciative of the space, and just knowing that they're accepted no matter what — and that their recovery status isn't a barrier to being in school," she says.

Though it's difficult to quantify the impact of the college's efforts so far, Pack says there's a greater understanding on campus about the disease of addiction. It's a statement echoed by Kim Treadaway, a recent graduate and former addict. Before Moseley's death and the college's initiatives, Treadaway says, addiction wasn't openly discussed much there. Now, she says, it is.

THE CHALLENGE

Prevent drug addiction from derailing students' education and threatening their lives.

THE APPROACH

Talk more openly about addiction and overdose prevention, and create a designated space for recovering addicts.

THE RESULT

The college community more openly acknowledges addiction and has adopted new practices to support those in need.

Asheville-Buncombe Technical Community College opened a private lounge on campus where students recovering from addiction can find a counselor or just a quiet space.



MIKE BELLEME FOR THE CHRONICLE

AGENDA

What's Ahead

HE student-success movement has generated plenty of buzz, and now it is working to sustain momentum and show impact. Here are four crucial fronts that will command more attention in the years ahead.

Inclusive networks: A promising and increasingly popular model to help institutions improve student success is a network of campuses that commit to certain goals or reforms, share ideas, and support one another through common challenges. The convener may be a group like the University Innovation Alliance, which coordinates 11 public research universities, or a grantmaker like the Bill & Melinda Gates Foundation, whose most recent network is the 31-member Frontier Set. Benefits such as grants, technical assistance, and research on outcomes can raise an institution's trajectory, and yet the process of forming the clusters often favors those that have already demonstrated progress. Large associations, most recently the Association of Public and Land-Grant Universities, have pulled more institutions into networks, as has the Latino advocacy group Excelencia in Education and the campaign to unite isolated private colleges called Yes We Must. But many campuses that stand to gain the most are still left out. "We need to find ways to even out the

investments in the institutions that are doing in many ways some of the hardest work," says Wil Del Pilar, vice president of higher-education policy and practice at the Education Trust.

Smoother transfer: Many students attend multiple colleges while pursuing a degree, a phenomenon known as swirl: Two-thirds of bachelor's-degree recipients and almost half of associate-degree completers have gone to more than one institution.

"We need to find ways to even out the investments in the institutions that are doing in many ways some of the hardest work."

Despite an increase in articulation agreements, which spell out how academic credit carries over, the process is still inefficient. The average total credit accumulation among graduates in some states is much higher than the required thresholds. The U.S. Government Accountability Office estimates a 43-percent loss of credit when students transfer. Advocates worry that this has thwarted many of the millions of Americans with some college and no degree. Promising models like the University of Central Florida's DirectConnect program and Northern Virginia Community College and George Mason University's Advance program guarantee admission, coordinate curricula, and provide advising. And several groups are now studying the transfer pro-

> cess, including the Aspen Institute, with a project in three states (Minnesota, Texas, and Virginia) to see what it takes to improve results.

State-policy reform: In the early stages of the student-success movement, grantmakers and advocacy groups lobbied states to enact reforms, frustrating campus leaders

who saw outside efforts to impose solutions. As more studies show the effects of particular policies, another round of reform is beginning, potentially involving more stakeholders this time. Two crucial issues are remedial education, especially which

1.3

models of instruction most benefit academically underprepared students, and ensuring quality in rapidly growing dual-enrollment programs for high-school students to earn college credit. Other pressing questions

Projects to Watch

Strong Start to Finish: Led by the Education Commission of the States and supported by a few grant makers that have pooled funds, this is the application in four public-college systems of more than a decade of research on remedial education. The goal is to increase the number of low-income, minority, and adult students who complete college math and English in their first year.

Guided Pathways: A dozen organizations are collaborating on an ambitious campaign to help colleges create clear academic maps to degrees and guide students along the way. The work is happening on the campus, system, and state levels, including both twoand four-year institutions, with an eye toward scaling up to reach all students.

CFEED: The Central Florida Education Ecosystem Database is an effort to analyze information on students in that region from pre-kindergarten through college. Two school districts, Valencia College, and the University of Central Florida are working with a foundation, a consulting firm, and an evaluator to identify patterns that will help them design interventions to improve student success.

Aspen Presidential Fellowship for Community College Excellence: The Aspen Institute's leadership-development program, which has trained 31 sitting community-college presidents, is moving into the four-year sector in 2019. The goal is to prepare a group of diverse leaders with a deep commitment to student success to transform institutions. involve money and incentives: how best to design student aid, how to reflect attendance patterns in outcomes-based funding, and how those formulas can avoid pitting institutions against one another or compromising goals to narrow achievement gaps.

Outcomes beyond graduation:

College completion is the main measure of student success, but it's vital to examine what happens after that, and more efforts are emerging. The three-year-old federal College Scorecard, a tool for consumers, incorporates earnings, debt burdens, and student-loan-repayment rates. Debates over privacy and data security have stalled a national unit-record system that would track individual students and reveal trends, while some states have built databases to link employment information with education programs. The University of Texas system recently announced a partnership with the U.S. Census Bureau to display outcomes by major for all campuses. Individual institutions are conducting surveys of graduate and employer satisfaction. And social mobility is a growing focus, especially through the work of the Equality of Opportunity Project, which shows, by college, the share of students from lower-income families who reach higher income brackets.

RECOMMENDATIONS

Dive into the data

Understanding students' experience at your institution is fundamental to improving their outcomes. Collect data on their demographics, behavior, and academic performance – Are they the first in their families to go to college? Showing up to class? Passing tests? – and study that information every which way, disaggregating as much as possible, to identify trends. Encourage faculty and staff members to use the data to spot structural problems and propose reforms. Aim to track warning signs in real time and design interventions to support students.

Invest in professional development

Improving student success largely comes down to the people in key roles: those who direct efforts and those who serve students. Tight budgets can leave little money for professional development, but a growing number of organizations offer it in many forms, including online. Some campuses are creating their own training programs, for example, putting their most experienced advisers in mentorship roles, or sharing resources with peer institutions. Consider joining or forming a network of colleges to share ideas, including how to solve common challenges.

Examine your institution

Before quickly adopting a heralded approach, evaluate whether you have the necessary conditions and infrastructure to make it work. Try process mapping, or diagramming how the institution operates from the perspective of students, then look to simplify the messages you send them and ease their navigation. Conduct focus groups with students, or survey them on their frustrations, and listen to people on the front lines who observe them daily.

Remember the classroom

Tracking attendance and grades won't get you very far without improving actual instruction. Innovation in teaching and learning, in terms of both technology and pedagogy, should be central to campuses' student-success plans. That means engaging the faculty, sharing data, and providing incentives to try new approaches. And don't overlook adjunct faculty members. Some institutions are changing how they train and schedule their adjunct instructors or designing programs to involve them more deeply in the work of student success.

Build crossfunctional teams

Breaking down silos is a cliché, and in a large organization, functional units serve a purpose. A potentially more productive approach is to tap people from across the campus to work together toward common goals. Representatives from institutional research and information technology can lend expertise, along with those from a range of offices serving students. Temporary action teams with defined projects and timelines may be easier to assemble and more dynamic than long-serving committees.

Allow for failure

Colleges are pursuing the important goal of helping students thrive under public pressure to get it right. And presidents may be eager to see progress. That can make it hard to admit when something isn't working, never mind examine why. But some efforts will fall flat, some tools will not deliver, and the graduation rate may not budge. Colleges should expect to experiment and fail — maybe a few times — and openly acknowledge as much. That honest reflection will help people learn from mistakes, make adjustments, and try again.

RESOURCES

Center for First-Generation Student Success, Naspa: Student Affairs Administrators in Higher Education

Family Friendly Campus Toolkit, Program Evaluation and Research Group

Guided Pathways Resource Center, American Association of Community Colleges

Leading for Community College Excellence: Curricular Resources, Aspen Institute

Ekowo, Manuela, and Iris Palmer, "The Promise and Peril of Predictive Analytics in Higher Education: A Landscape Analysis," New America, October 2016

Goldrick-Rab, Sara, Jed Richardson, and Peter Kinsley, "Guide to Assessing Basic Needs Insecurity in Higher Education," #RealCollege, July 2018

Lumina Foundation, "Beyond Financial Aid: How Colleges Can Strengthen the Financial Stability of Low-Income Students and Improve Student Outcomes," March 2018

The Education Trust, "Using Data to Improve Student Outcomes: Learning From Leading Colleges," May 2016

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rom breaking news to key insights to real-world advice, *The Chronicle of Higher Education* is dedicated to serving academic leaders and professionals. Our newsletters, subscriptions, special reports, and exclusive data projects provide a comprehensive view of the latest trends and critical issues affecting academe. For more than 50 years, higher-education professionals from around the world have trusted *The Chronicle's* in-depth reporting and analysis to understand their world and make informed decisions.

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University of Maine System Board of Trustees

AGENDA ITEM SUMMARY

NAME OF ITEM: Student Representatives: Discussion

INITIATED BY: David M. MacMahon, Chair

BOARD INFORMATION: X

BOARD ACTION:

BOARD POLICY:

N/A

UNIFIED ACCREDITATION CONNECTION:

N/A

BACKGROUND:

The Academic and Student Affairs Committee of the Board invites Student Representatives of the Board of Trustees to bring forward discussion items relevant to their campus communities and the University of Maine System.

3

University of Maine System Board of Trustees

AGENDA ITEM SUMMARY

NAME OF ITEM: Chief Academic Officer (CAO) Update

INITIATED BY: David M. MacMahon, Chair

BOARD INFORMATION: X BOARD ACTION:

BOARD POLICY:

UNIFIED ACCREDITATION CONNECTION: N/A

BACKGROUND:

At the request of Academic and Student Affairs Committee members, the Chief Academic Officers of the University of Maine System Universities will give brief updates on current and forthcoming Unified programs and collaborations.

University of Maine System Board of Trustees

AGENDA ITEM SUMMARY

NAME OF ITEM: New Academic Program Proposal: B.S. Business Administration - Business Information Systems and Security Management, UM

INITIATED BY: David M. MacMahon, Chair

BOARD INFORMATION:

BOARD ACTION: X

BOARD POLICY:

305.1 Program Approval, Review & Elimination Procedures

UNIFIED ACCREDITATION CONNECTION:

N/A

BACKGROUND:

The University of Maine (UM) is seeking permission to offer a Bachelor of Science in Business Administration - Business Information Systems and Security Management.

As described in the included proposal from UM, this undergraduate program in the Maine Business School focuses on fulfilling a growing need among Maine employers, according to Burning Glass. This data shows over 2,500 job openings in the state while higher education institutions within the state produce about 200 students in this area each year. Faculty at the Maine Business School have worked with the University of Maine at Augusta to determine course equivalencies, giving students in the UM BSBA-BISSM and the UMA BS in Cybersecurity additional coursework options at both Universities.

The proposal was reviewed at all appropriate faculty and administrative levels at UM and was reviewed and subsequently recommended by the Chief Academic Officers Council. Dr. Robert Placido, Vice Chancellor of Academic Affairs recommended the program to the Chancellor. Chancellor Malloy signed his approval of the Bachelor of Science in Business Administration - Business Information Systems and Security Management on August 18, 2022.

TEXT OF PROPOSED RESOLUTION:

That the Academic and Student Affairs Committee forwards this item to the Consent Agenda at the November 13-14, 2022 Board of Trustees meeting for approval of the following resolution:

That the Board of Trustees accepts the recommendation of the Academic and Student Affairs Committee, and approves the Bachelor of Science in Business Administration in Business Information Systems and Security Management at the University of Maine at Orono. Academic & Student Affiars Committee - New Academic Program Proposal: B.S. Business Administration - Business Information Systems and Security...



Vice Chancellor for Academic Affairs 15 Estabrooke Drive Orono, ME 04469

Date: October 5, 2022

Tel: 207-973-3211 Fax: 207-581-9212 www.maine.edu To: Dannel Malloy, Chancellor University of Maine System (UMS)

From: Robert Placido, VCAA

Regarding: UM Program Proposal: B.S. Business Administration, Business Information Systems and Security Management

RAP

The University of Maine

University of Maine at Augusta

University of Maine at Farmington

University of Maine at Fort Kent

University of Maine at Machias

University of Maine at Presque isle

> University of Southern Maine

Please find the attached program proposal from the University of Maine (UM) to offer the B.S. Business Administration, Business Information Systems and Security Management. The attached material includes documentation of university level support including approval from President Joan Ferrini-Mundy as well as the full program proposal.

The proposed suspension of the B.S. Business Administration, Business Information Systems and Security Management was reviewed and recommended by the Chief Academic Officer's Council (CAOC) on August 18, 2022. I also recommend this program for your approval.

l approve	I do not approve for the reasons listed below	Additional information needed for decision	Action
V			Recommend the UM BSBA - BISSM

Chancel or Dannel Malloy

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Date

Office of the Executive Vice President for Academic Affairs & Provost



5703 Alumni Hall, Suite 201 Orono, Maine 04469-5703 Tel: 207.581.1547 Fax: 207.581.1633 umaine.edu

TO:	ROBERT PLACIDO, VICE CHANCELLOR FOR ACADEMIC AFFAIRS (UMS)
FROM:	JOHN C. VOLIN, EXECUTIVE VICE PRESIDENT FOR ACADEMIC AFFAIRS AND PROVOST
SUBJECT:	PROPOSAL FOR BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION (BSBA) IN BUSINESS INFORMATION SYSTEMS AND SECURITY MANAGEMENT (BISSM)
DATE:	MAY 11, 2022
CC:	MEREDITH WHITFIELD, CHIEF OF STAFF FAYE GILBERT, EXECUTIVE DEAN OF THE MAINE BUSINESS SCHOOL JASON HARKINS, ASSOCIATE DEAN OF THE MAINE BUSINESS SCHOOL

The Faculty of the Maine Business School propose a new Bachelor of Science in Business Administration (BSBA) in Business Information Systems and Security Management (BISSM), to build on their existing undergraduate concentration in Business Information Systems and partnerships within UMaine as well as partners across the University of Maine System (UMS).

<u>Rationale</u>

The proposed degree in the Maine Business School focuses on fulfilling a growing need among Maine employers, according to Burning Glass. This data shows over 2,500 job openings in the state while higher education institutions within the state produce about 200 students in this area each year.

In addition, this contributes to UMaine's SVV through preparing learners for success by aligning tailored academic pathways with the skills needed to thrive in a range of career contexts and builds on UMaine's reputation as an easily accessible and highly desirable partner to apply creativity and innovation to solve problems for Maine businesses, K-12 education, industry, and the state. This new program proposal meets our values: Fostering Learner Success, Discovering & Innovating, and Growing & Advancing Partnerships.

This proposal has received all appropriate campus review and approval. President Ferrini-Mundy and I fully support the creation of the B.S. in Business Administration in Business Information Systems and Security Management (BISSM).

APL X-P.1 "Academic Program Approval", Section I "Approval of Undergraduate Majors, graduate degree programs, and advanced certificates of study", Step 3. "University of Maine System (UMS) Evaluation" is the relevant section of the University of Maine System Administrative Practice Letters. An excerpt of the policy indicates "After completion of the campus program evaluation process, University of Maine System evaluation is initiated by submission of the proposal by the university President to the Vice Chancellor for Academic Affairs who will acknowledge receipt of the document and distribute the proposal electronically to members of the Chief Academic Officers Council (CAOC)."

Please let me know if you have any questions or if there is any additional information you require.

MAINE'S LAND GRANT, SEA GRANT AND SPACE GRANT UNIVERSITY

Addendum to Proposal for a new major in the Maine Business School Business Information Systems Security Management

On June 3rd, 2022 Dr. Henry Felch, Associate Professor of Cybersecurity and Computer Information Systems at UMA, Dr. C. Matt Graham, Associate Professor of Business Information Systems at the Maine Business School, and Dr. Jason Harkins, Associate Dean of the Maine Business School and Associate Professor of Entrepreneurship met. They discussed the proposal for a new major in the Maine Business School in Business Information System Security Management as part of the Bachelor of Science in Business Administration (BSBA) to consider course equivalencies between the BISSM proposal and UMA's Bachelor of Science in Cybersecurity. They identified the following opportunities for students to this new degree if approves:

Core Corse Equivalency:

- ISS 350 Databases and Database Security at UMA is equivalent to BIS 267 Database Management and Security at UM.
- ISS 470 Information Security Management at UMA is equivalent to BIS 363 Information Security Management at UM

Students in either the BISSM program or at UMA's cybersecurity program will be able to take either equivalent course as available as credit towards degree progress in either the BISSM at the Maine Business School or in the BS in cybersecurity at UMA. Prerequisites can be waived at either campus at the discretion of each college when needed to support progress to degree.

Opportunities for Collaboration:

- They agreed to look for opportunities for teaching collaborations and interdisciplinary development between BISSM's BIS 468 Business Strategy, Security and Information Systems course and UMA's cyber range.
- They agreed students enrolled in the BISSM program can use free electives to take UMA courses leading to a UMA Information Assurance Certificate as part of earning their BSBA with a BISSM major. If students choose to pursue this option, they would need the following additional certificate course requirements (in addition to those identified above):
 - ISS 220 Security Risk Management 3 CR
 - ISS 240 Security Policy and Governance 3 CR
 - o ISS 250 Auditing IT Infrastructures 3 CR
 - o ISS 320 Security Monitoring 3 CR
 - ISS 360 Incident Response 3 CR

This option can be pursued by students in the BSBA within their 120 hours required to earn a Bachelor's Degree and could be attractive to students interested in this rapidly growing field.

• They agreed to add ISS 220: Security Risk Management and CIS 110 Programming Fundamentals as electives in the BISSM proposal.

Academic & Student Affiars Committee - New Academic Program Proposal: B.S. Business Administration - Business Information Systems and Security...

4.1

Program Name:

Bachelor of Science in Business Administration (BSBA) in Business Information Systems and Security Management (BISSM)

Summary of Changes:

The Maine Business School (MBS) proposes a Bachelor of Science in Business Administration in Business Information Systems and Security Management (BISSM). The proposed launch date is for Fall semester of 2022. This new major will build on the existing Business Information Systems (BIS) Concentration and its existing partnerships with the New Media and Computer Science faculty of the School of Computing and Information Science (SCIS) as well as partners across the University of Maine system. As a major, Business Information Systems and Security Management (BISSM) will attract new enrollment and produce graduates with cutting-edge skills fulfilling a growing need among Maine employers.

The signatures below indicate approval of the program proposal summarized above.

Jusan My Susan Myrden (Mar 29, 2022 10.47 EDT)

Dr. Susan Myrden Chair, MBS Undergraduate Curriculum Cmte

Fays Gilbert

Dr. Faye W. Gilbert Executive Dean, Maine Business School

Dr. Brlan Olsen Associate Provost for Student Success and Strategic Initiatives

Dr. John C. Volin Executive Vice President for Academic Affairs & Provost

Dr. an Ferrini-Mundy President of University of Maine & University of Maine at Machias

Mar 29, 2022 Date

March 29, 2022 Date

 $\frac{O4}{Date} \frac{25}{2022}$ $\frac{5}{6} \frac{2022}{2022}$ Date

Date

Office of the President University of Maine University of Maine at Machias



5703 Alumni Hall Orono, Maine 04469-5703 Tel: 207.581.1512 umaine.cdu machias.edu

April 27, 2022

- TO: William "Dee" Nichols, President Faculty Senate
- FR: Joan Ferrini-Mundy Joan Journ Mundy President

John C. Volin Executive Vice President for Academic Affairs and Provost

- CC: Meredith Whitfield, Chief of Staff Kimberly D. Junkins, Administrative Specialist, CL1, Faculty Senate Corey Watson, Executive Assistant to the Executive Vice President for Academic Affairs and Provost
- RE: Response to Faculty Senate Motions from April 6, 2022, meeting, and received for action . on April 7, 2022.

Thank you for your letter dated April 7, 2022, regarding the motions approved at the April 6, 2022 Faculty Senate meeting. After review with Executive Vice President for Academic Affairs and Provost John C. Volin, my responses to the April 6th UMaine Faculty Senate Motions are as follows:

Regarding the motions:

1. Regarding Motion to Change the Bylaws

I support this motion as written with the following suggestion (in **bold**) to the Faculty Senate for an amendment:

Article VII, Section 5, Subsection B: Membership be amended from "and the Associate Provost for Student Success and Strategic Initiatives," to "and the Associate Provost for Student Success and Strategic Initiatives, or a designated appointee."

Most other Faculty Senate Committee ex-officio members allow a designee to take the place of the VPRDGS or EVPAA & Provost, when appropriate. This would allow the same flexibility to the Associate Provost for Student Success and Strategic Initiatives as well.

Maine's Land Grant, Sea Grant and Space Grant University with a Regional Campus in Machias Thank you for your good work on updating and amending the Faculty Senate Bylaws to reflect current collaborations between administration and faculty.

2. Regarding Motion from University of Maine's Faculty Senate Program Creation and Reorganization Review Committee (PCRRC) for Consideration by the Full University of Maine Faculty Senate

I support the motion as written. I appreciate your attention to reviewing and approving new degree programs that generate new learning opportunities for students.

4.1

Motion – From the University of Maine's Faculty Senate Program Creation and Reorganization Review Committee (PCRRC) for consideration by the Full University of **Maine Faculty Senate**

Regarding the Maine Business School's Proposal for a New B.S. Degree Program in Business Information Systems and Security Management (BISSM) April 6, 2022

Background:

Proposals for new degree programs at the University of Maine, and subsequent actions on those proposals, follow procedures detailed in UM System BOT Policy 305.1, APL X-P.1 Academic Program Approval (https://www.maine.edu/students/office-of-the-vice-chancellor-of-academic-affairs/apl-<u>x-p-1/</u>), and also procedures in "The University of Maine 120-Day Process for Approval of New Academic Degree Programs" (Chapter 2; revised Oct. 16,

2019, https://umaine.edu/facultysenate/committees/pcrrc/).

Key steps are:

1) The Unit or College produces a written description and rationale for the new program in 250 words or less (this is called a "Program Request");

2) To go forward that "Program Request" must be approved by the Provost, the UM System Vice Chancellor for Academic Affairs (VCAA) and the Chief Academic Officers Council (CAOC); 3) If approved, the sponsoring College or Unit prepares a "Full Program Proposal", which is filed with: The Provost's Office; The chair of the Undergraduate Program Curriculum Committee (UPCC) or, if a graduate program, the Associate Vice President for Graduate Studies for the Graduate Board (GB); and, The chair of the Program Creation and Reorganization Review Committee (PCRRC) of the Faculty Senate for review and recommendations;

4) The PCRRC distributes the "Full Program Proposal" to all members of the Faculty Senate for information and review:

5) The PCRRC schedules and hosts a PCRR Committee meeting to discuss the "Full Program Proposal" with the primary proponents of the proposal;

6) After #5, the PCRRC schedules and hosts a "Campus-wide Hearing" to gather further comments regarding any concerns by the university community;

7) Because it is customary for Senate motions to presented to the Full Senate for discussion two weeks prior to taking a vote, the PCRRC will briefly discuss the "Full Program Proposal" at a 'Members-only Meeting' of the Senate, and will introduces two potential motions, only one of which will to come up for a vote at an upcoming Elected Senators Meeting - e.g., either in support or non-support of the new program proposal - with the specific motion to be as determined following the "Campus-wide Hearing" (#6);

8) A official vote will be taken by the Faculty Senate to report to the President the Senate's recommendation either in support of, or not in support of, the creation of the new degree program.

Motion:

With steps #1 through #7 having taken place, and the members of the PCRRC (Program Creation and Reorganization Review Committee) of the University of Maine Faculty Senate being favorably inclined, having heard no significant opposition to the proposal, the Faculty Senate hereby moves to recommend to the President that the Maine Business School's Proposal for a New B.S. Degree Program in *Business Information Systems and Security Management (BISSM)* go forward.

Vote: Approved

Office of the Executive Vice President for Academic Affairs & Provost

April 26, 2022

MAINE

5703 Alumni Hall, Suite 201 Orono, Maine 04469-5703 Tel: 207.581.1547 Fax: 207.581.1633 umaine.edu

To: John C. Volin, Executive Vice President for Academic Affairs and Provost

From: Brian Olsen, Associate Provost for Student Success and Strategic Initiatives

Re: Approval of proposed major in Business Information Systems and Security Management

Dear Provost Volin,

The Undergraduate Program Curriculum Committee met on March 29 and, in an advisory capacity, endorsed the proposed major in Business Information Systems and Security Management (BISSM) submitted by the Maine Business School. A brief synopsis:

Business Information Systems and Security Management

The Maine Business School (MBS) proposes a Bachelor of Science in Business Administration in Business Information Systems and Security Management (BISSM). The proposed launch date is for Fall semester of 2022. This new major will build on the existing Business Information Systems (BIS) Concentration and its existing partnerships with the New Media and Computer Science faculty of the School of Computing and Information Science (SCIS) as well as partners across the University of Maine system. As a major, Business Information Systems and Security Management (BISSM) will attract new enrollment and produce graduates with cutting-edge skills fulfilling a growing need among Maine employers.

The proposal received review by the Maine Business School's Curriculum Committee and was signed by Dean Faye Gilbert on March 29. I am supportive of this proposed new major. Thank you for your consideration.

New Major Proposal For consideration by the Maine Business School

1. Proposed Program Title

Business Information Systems and Security Management (BISSM)

2. Primary Applicant -

Name:	Nory Jones			
Position Title:	Professor, BIS, Maine Business School			
Campus Address:	323 Donald P Corbett Business Building			
Contact Number:	581-1995	Email:	njones@maine.edu	
Signature/Date:				

3.	Co-Applicant(s) Information				
	Name	Email	Academic or Admin. Office(s)	Role in Proposed Work or Program	Initials
	C. Matt Graham	c.matt.graham @maine.edu	DPC 330	Co-leader of project	CMG
	Tanya Beaulieu	tanya.beaulieu @maine.edu	DPC 317	Co-leader of project	ТҮВ
	Nadège Levallet	nadege.levallet @maine.edu	DPC 303	Co-leader of project	NL

College Dean: Dr. Faye Gilbert

Proposed New Degree Summary

The Maine Business School (MBS) proposes a Bachelor of Science in Business Administration in Business Information Systems and Security Management (BISSM). The proposed launch date is for Fall semester of 2022. This new major will build on the existing Business Information Systems (BIS) Concentration and its existing partnerships with the New Media and Computer Science faculty of the School of Computing and Information Science (SCIS) as well as partners across the University of Maine system. As a major, Business Information Systems and Security Management (BISSM) will attract new enrollment and produce graduates with cutting-edge skills fulfilling a growing need among Maine employers.

The Opportunity

According to Forbes¹, digital transformation requires that "leaders and IT teams in any enterprise should work hand in hand to meet business requirements, drive innovation, and march towards continuous improvement". However, this march towards digital transformation creates an increasing complex environment of which security and privacy are a key to success, yet increasingly at risk. For example the impact of security breaches became apparent in the spring of 2021 when a single compromised password at Colonial Pipeline Co. took down a network of fuel pipelines leading to massive fuel shortages and disruption across the Eastern United States.

Research shows that addressing information security and privacy within organizations goes beyond implementing strong technical solutions. As Roger notes in the Diffusion of Innovations, one of the most difficult, yet important aspect of innovation is the implementation which requires leadership and strong change management skills. To this end, it is critical that we prepare the workforce by addressing the business and management implications of information security. Increasingly it is important that business leaders collaborate closely with their technical counterparts. A report by Sci-Tech² with survey responses by nearly 500 North American professionals emphasize the importance of collaboration. They report that "companies look to improve cross-organizational collaboration, increase innovation and solve for business issues, all while trying to bring the best and brightest digital talent on board." Nowhere is the need more pressing than in the area of information security. Privacy and the securing of data is a complex issue involving not only technical skills, but also applying sound management practices to monitor, prevent, and respond to security issues. In other words, organizations need to elevate their approach to security to go beyond the operational and move toward the management and strategic implications of security. This last point is particularly relevant for our proposed major in Business Information Systems and Security Management (BISSM). As a degree based in business, our aim is to combine valuable business skills with technology in order to create leaders knowledgeable in information security risk management and response. This a combination that is greatly needed and in short supply in our businesses and organizations today.

The Need

According to Cybersecurity Investments, cybersecurity employment increased 350% during seven years, from one billion in 2014 to 3.5 billion in 2021. This trend is expected to continue at least through 2025³. Within this area, there is a high demand for information systems managers

https://www.forbes.com/sites/brianrashid/2017/06/13/digital-transformation-and-innovation-in-todays-business-world

Rashid, B. (2017). Digital Transformation and Innovation in Today's Business World. Forbes.

² http://www.sci-tech-today.com/news/Where-Will-the-2018-Tech-Jobs-Be-/story.xhtml?story_id=033003FY1PL9

³ https://www.globaltechcouncil.org/cyber-security/cybersecurity-jobs-report-3-5-million-openings-through-2025/

and security management professionals in the United States. The US Bureau of Labor Statistics (BLS) estimated that employment for information security analysts will grow by 33% from 2020 to 2030, while information system managers are projected to grow 11% during this same time period⁴. BLS reports that both professions are growing faster than the average occupation growth rate with openings coming not only from attrition and retirements, but also a growing demand, especially among the security aspects of technology. Drawing on BLS data, median salaries for security analysts are \$103,590 and the median salary for information system managers was \$151,150 as of May 2020. US News and World Report⁵ states, "The Labor Department predicts that tech jobs will grow faster than the average for all jobs at a rate of 13 percent this decade." These jobs include software developer, IT security analyst, IT manager and more. U.S. Bureau of Labor Statistics predicts that in 2020 there will be 1.4 million more software development jobs than applicants who can fill them. Stating "schools and other tech education programs can't seem to produce candidates fast enough."

According to a Burning Glass report, top skills in demand related to information security management include risk management, which analyzes data to understand the risks the organization can face and minimizes them and threat intelligence, which analyzes the organization or business data for potential threats among others⁶. Other skills in demand for business technology analysts included database management and SQL, software development, project management, web development, systems design, systems analysis, business processes and analysis, system administration and cloud solutions among others. Graduates with a BISSM major would be qualified to fill these positions depending on the mix of electives selected.

Maine's Need

Nationally, a recent Burning Glass report showed (for undergraduate degrees) 1,844,334 job postings in the field of both business information systems and security management. In New England, there were 97,058 job postings. In Maine alone, we see over 2,500 job openings. However, higher education institutions within the state of Maine are only matriculating about 200 students with security management skills each year, demonstrating that there is a wide gap in the number of individuals prepared to fulfill the needs for these important jobs.

Furthermore, there is a great need for technology skills in Maine, according to New Ventures Maine⁷: "Along with the rest of the country, Maine will continue to see an increasing need for IT and security professionals in the next decade. Employees are needed to maintain existing networks and security, create software, and develop mobile apps". Examples of Maine employers in need of business information systems and security management majors include but are not limited to:

• Tyler Technologies, Inc.

⁴ https://www.bls.gov/ooh

^s https://money.usnews.com/careers/best-jobs/rankings/best-technology-jobs

https://cisomag.eccouncil.org/these-are-the-top-4-cybersecurity-skills-in-demand-in-2021/#:~:text=A%20few%20of %20the%20top,control%2C%20and%20health%20information%20security

⁷ http://newventuresmaine.org/2017/04/now-hiring-technology-jobs-maine/

Academic & Student Affiars Committee - New Academic Program Proposal: B.S. Business Administration - Business Information Systems and Security...

- S.W.Cole Engineering, Inc.
- CM Almy
- Downeast Community Partners
- MaineHealth Corporate
- Kennebec Intra-District Schools RSU 2
- Idexx
- Cianbro
- TD Bank
- Kennebunk Savings
- Bangor Savings Bank
- Healthinfonet
- Siemens
- Northern Light Health
- LL Bean

Addressing Concerns for Possibly Competing with Existing UMS IT/IS/Cyber Majors

Impact of program on existing programs on both the home campus and other USM campuses:

The BISSM major is unique from the degrees offered by the School of Computing and Information Sciences. Whereas computer science programs focus on algorithms, software development, and foundations and applications of computing technology, the BISSM major will focus on the management and application of technology in solving business needs and protecting information assets. The programs in Information Systems (MS, graduate certificate) offered as part of the SCIS Spatial Computing programs are available only at the graduate level.

The BISSM major would also be different than cybersecurity degrees offered at the University of Maine at Augusta (UMA), the University of Southern Maine (USM), the University of Maine at Presque Isle, and the University of Maine at Fort Kent. These programs have a more technical focus and draw on the NSA's designation and ABET accreditation. While the core competencies taught in these cybersecurity degree programs focus on technical skills to deter cyber-attacks, the MBS's BISSM degree focuses its core competencies on information security management from an organizational perspective. The BISSM major will fall under the AACSB accreditation, the highest accreditation given to business schools.

Core security management competencies taught in the proposed BISSM degree include: information security governance, risk management, information security program development and management, designing information systems with security in mind, and information security incident management. In this curriculum, students will learn how to identify, assess, and prioritize information systems security risks and strategies for responding to breaches when they occur.

Letter of Support from Dr. Penny Rheingans, Professor of Computer Science, SCIS Director

This BISSM major will complement UMaine's Computer Science degree. As part of our collaboration with the computer science degree, the School of Computing and Information Science Director, Dr. Penny Rheingans wrote a letter of support for the creation of the new major at the MBS. Quoting her directly she wrote in the letter of support:

"I would like to indicate my support for the creation of a new major in Business Information Systems. Such a major would focus on the issues and strategies of designing technology solutions to address business management challenges. In this way, it would complement, rather than compete with, the existing BS degree in Computer Science that focuses more on the design and implementation of new technology. The new degree would likely appeal to a different set of incoming students than our current degrees and broaden the opportunities at UMaine to attract more students."

Program Overview:

We suggest that a major in Business Information Systems and Security Management in the Maine Business School is needed to provide students with the leadership, management, technology skills and knowledge to achieve innovation and competitive advantage in the digital transformation era of business and cybersecurity. The opportunity we present is to grow this program from an existing curriculum offered as a Business Information Systems (BIS) concentration. By reframing the topic as BISSM, we encourage further interdisciplinary collaboration and by making it a major in its own right, we can meet a real need for digital leaders in Maine's economy as well as regionally and nationwide, and attract new enrollment.

The planned program curriculum is based on the guidelines set forth by the ACM/AIS IS2020⁸ Model Curriculum. The IS2020 curriculum offers "recommendations and guidelines for undergraduate degrees in Information Systems"⁹. Notably, it is important to help students develop a strong knowledge base of the core aspects of IS, including technology (hardware, software, etc.), data and information, people and the organization, business processes and partners.

No new courses or faculty are needed for the proposed major. Security management will be introduced in BIS 235 Digital Business Transformation, the BIS 267 Database Security class will include topics on security in multitenant environments, data redaction, sensitive data protection and privilege analysis. The BIS 363 class will be redesigned to focus on security management that includes topics on security governance, risk management, information security program development and management, designing information systems with security in mind, and information security incident management. BIS 468 will focus on IS strategy management including security management.

Outline of required and/or elective courses:

⁸ https://www.acm.org/binaries/content/assets/education/curricula-recommendations/is2020.pdf

⁹ Ibid p.10

Core Business Courses: All BSBA Business Students Must Complete Twelve (12) Core Business Courses:

- Introduction to Business (MGT 101)
- Excel Fundamentals for Business Analytics (BIS 105)
- Financial Accounting (ACC 201)
- Managerial Accounting (ACC 202)
- The Legal Environment of Business (MGT 220)
- Digital Business Transformation (BIS 235)
- Principles of Marketing (MKT 270)
- Introduction to Management (MGT 325)
- Production/Operations Management (MGT 337)
- International Business (MGT 343)
- Business Finance (FIN 350)
- Strategic Management (MGT 449)

Four Core Discipline Courses

- BIS 267 Database Management and Security
- BIS 363 Information Security Management
- BIS 364 Enterprise System Configuration
- BIS 468 Business Strategy and Information Systems

Complete One Elective

- BIS 345 Business Analytics for Security Management
- BIS 490 Topics in Business Information Systems
- COS 125 Introduction to Problem-Solving using Computer Programming
- ISS 240 Security Policy and Governance (UMA)
- ISS 334 Cyber Law (UMA)
- ITT 451 Cyber Law Policies and Ethics (USM)
- COS 184 Python Programming (USM)
- BUS 240 Change Management (UMPI)
- Other courses as approved

a. The BISSM major can be taught on campus, online, and in hybrid delivery

Due to the ongoing COVID-19 pandemic, many of the current BIS concentration classes are offered on campus, online, and in hybrid delivery to accommodate students' health and personnel safety needs. As evidence of this, currently BIS 235 Digital Business Transformation and BIS 267 Database Management have been taught hybrid and fully online. BIS 363 Network Design and Applications has been taught in a hybrid format. The BISSM major would continue to offer these three modalities to deliver the required courses to students.

b. Certification & Certificate Opportunities

- In BIS 363 students are prepared to earn The NetworkPro certification
- In BIS 364 students are offered the opportunity to earn the Salesforce Admin badge within the Salesforce Trailhead.
- Students who complete BIS 235 Digital Business Transformation, BIS 345 Business Analytics, and BIS 364 Enterprise System Configuration earn a SAP Certificate of Completion through the MBS / SAP University Alliance.

I. Program Resources

- a. Personnel: (Vita's in appendix)
 - i. Dr. Nory Jones, Professor of Business Information Systems
 - ii. Dr. C. Matt Graham, Associate Professor of Business Information Systems
 - iii. Dr. Tanya Beaulieu, Assistant Professor of Business Information Systems.
 - iv. Dr. Nadège Levallet, Assistant Professor of Management and Information Systems
- b. No new equipment or additional space will be needed.

c. The BISSM major would continue the BIS concentrations interdisciplinary partnership with School of Computing and Information Sciences, New Media, and other University of Maine system campuses.

- d. BIS Faculty Resources
 - i. Teaching Loads
 - Dr. Nory Jones: 2/2
 - Dr. Matt Graham: 2/3
 - Dr. Tanya Beaulieu: 3/2
 - Dr. Nadège Levallet: 3/2
 - ii. Proposed Teaching Schedule to address Core and Electives

	/	1	/.	s /.
	Jones	Grahan	Beaufie	Levalle
Fall		ſ	[ſ
BIS 235	2 Sections	1 Section	1 Section	1 Section
BIS 267		2 Sections		
BIS 364			1 Section	
Spring				
BIS 235	2 Sections		1 Section	1 Section
BIS 363		1 Section		
BIS 468				1 Section
BIS 345		1 Section		

II. Total Financial Consideration

a. No new faculty required

- b. No additional administrative and/or support costs required
- c. No new equipment required
- d. No other additional financial resources required

Enrollment Projections

Enrollments in the existing Business Information Systems concentration have experienced significant year-to-year growth since its inception in 2014, and BIS is now the largest concentration in the Maine Business School which is not offered as a major. Enrollment numbers are listed below:

These enrollment numbers show excellent growth between fall 2014 and fall 2020:

Year	Difference in enrollment	Percent Gain
Spring 2014 to fall 2020	31 + students	115%

Semester / Year	Enrollment Numbers
Spring 2014	27 students
Fall 2021	47 students

We note that the numbers have since continued to increase. We attribute this growth to some replacement of faculty as well as an expanded mix of faculty in an effort to continually update the curriculum to ensure our students are current in new technologies. In addition, students informally reported that they would have declared BIS as a major if that was available.

Therefore, with adequate promotion of the concentration to our students, focusing on the demand in jobs and making this a major, we believe we will see a significant increase in student enrollment. Additionally, the Bureau of Labor Statistics shows that employment of information security analysts is projected to grow 33% from 2020 to 2030. Similarly, the Bureau of Labor Statistics reports that information security analyst's jobs are projected to grow 33 percent from 2020 to 2030.

In addition, we also note that at the start of 2019, enrollments began increasing again. The pandemic has also created a greater awareness of the need for technologies with online learning replacing traditional classes as the university responded to the crisis, and businesses accomplishing more through technology-mediated activities.

Projected Growth

Given our past year-to-year growth between 2014 and 2021, we conservatively expect the new Business Information Systems and Security Management (BISSM) major to see an initial growth of approximately 20% a year. This estimate takes into consideration that since the first year the BIS concentration began taking enrollments, we saw a 100% increase in enrollments between

Spring 2014 and Spring 2015 with continuing increases in enrollments year-to-year through Spring 2026

Year	20% Increase	Total Projected Enrollments in Business Information Systems and Security Management (BISSM) Major
Fall 2021 to Fall 2022	9 + students	56 students
Fall 2022 to Fall 2023	11 + students	68 students
Fall 2023 to Fall 2024	14 + students	81 students
Fall 2024 to Fall 2025	16 + students	97 students
Fall 2025 to Fall 2026	19 + students	117 students

Another tangible indicator of the growing demand for BIS classes (such as BIS 267 Database Management) is that we had to move our computer lab from a 30-seat lab to a 50 + seat lab at the Maine Business School and increase the number of sections of BIS 267 offered each year to accommodate student demand for the course. This holds true for the other courses in the concentration. These observations from our program are confirmed by the "Burning Glass" report which indicated one of the highest skills in demand is in the <u>data and security</u> field.

Program Assessment and Evaluation

The Maine Business School's Bachelors of Science in Business Administration is accredited by the AACSB, the world's premier accrediting body for business schools. The AACSB accreditation is "the longest-standing, most recognized form of specialized accreditation that an institution and its business programs can earn"¹⁰. Each accredited program is evaluated on a five-year cycle, based on standards around 1) Strategic Management and Innovation, 2) Learner Success, and 3) Thought Leadership, Engagement and Societal Impact.

Core to the idea of continuously improving on learner success is the assessment and evaluation of program level learning outcomes (ALO). As a new major in the Maine Business School, Business Information Systems Security Management students will engage in the same core course offerings required of all MBS majors¹¹ and will earn a business degree. The MBS has developed and implemented assessment mechanisms to ensure that the BSBA achieves Assurance of Learning Outcomes outlined below. Assessment is conducted on each of the outcomes regularly to ensure that business students are achieving key learning outcomes. The ALOs for the BSBA program determined by the business faculty in alignment with our mission are:

¹⁰ https://aacsb.edu/educators/accreditation

¹¹ The MBS core offerings include the following classes: Introduction to Business (MGT 101), Excel Fundamentals for Business Analytics (BIS 105), Financial Accounting (ACC 201), Managerial Accounting (ACC 202), The Legal Environment of Business (MGT 220), Management Information Systems (BIS 235), Principles of Marketing (MKT 270), Introduction to Management (MGT 325, Production/Operations Management (MGT 337), International Business (MGT 343), Business Finance (FIN 350), Strategic Management (MGT 449)

- 1. Knowledge (core business knowledge)
- 2. Communication (effective oral and written communication)
- 3. Teamwork. (effective team members)
- 4. Ethics
- 5. Global Perspectives.
- 6. Technological Agility/Problem Solving.

While all aspects of these ALOs are relevant to the major, the BISSM major will significantly contribute to the achievement of ALO #6 regarding technological agility and the development of problem-solving ability: "Our learners will feel confident in using technology and analytical techniques to help solve problems and draw appropriate conclusions". Students graduating with a BISSM will have developed a deep understanding of the value of technology in organizations for competitive advantage.

In addition, in order to assess student success within the BISSM major, we will collect and analyze the following data on a yearly basis:

- 1. Surveying employers to understand whether the BISSM major is keeping current in providing the knowledge and skills needed in the workplace.
- 2. Tracking the number of students who achieve the following:
 - NetworkPro Certification
 - Salesforce Administration Trail
 - Salesforce Cybersecurity Trail
 - SAP Certificate of Recognition

Appendix I: BISSM Proposal Course Descriptions

Digital Business Transformation (BIS 235)

Technologies and information systems represent a crucial part of any organization to provide competitive advantage in terms of efficiency, value, quality and productivity. In today's economy, businesses require continual digital transformation to become or remain competitive. The focus of this course is to provide students with the knowledge and tools in essential technologies including databases, computer networks, cloud computing, transactional software, integrated enterprise software, e-business systems, cyber security, and emerging technologies.

Four Core Discipline Courses

BIS 267 Database Management and Security

Introduction to technical and managerial issues associated with databases. Topics include structured query language (SQL) and database usage in decision making. Focuses on database security to mitigate against major database security issues. Students will learn how to incorporate security models into the database life cycle and use database security for allowing or disallowing user actions on the database and the objects within it.

BIS 363 Information Security Management

Introduces the design, management and information security of information systems in networked environments. Topics include telecommunications, network architecture, and a focus on information security governance, risk management, information security program development and management, and information security incident management.

BIS 364 Enterprise System Configuration

Discusses advanced topics in business processing including concepts related to Enterprise System (ERP) principles, concepts, and techniques. Grounded in an SAP (Systems, Applications & Products in Data Processing) architecture, this course counts toward the SAP Certificate of Completion. Topics in the class include understanding system requirements and how business processes and business rules translate into system configuration. Using SAP, students will learn the fundamentals of configuring an enterprise system from requirement gathering, through design, configuration, and testing.

BIS 468 Business Strategy, Security and Information Systems

Digital technologies have emerged as critical organizational resources to compete in dynamic markets. When embracing digital business transformation, leaders must rethink how to operate their organization, and how best to compete in the marketplace. Notably, business and IT leaders need to manage information systems by integrating major software systems like customer relationship management, supply chain management, big data, analytics, artificial intelligence, cloud technologies, and the Internet of all things, across functional areas of the organization, but also on various digital platform ecosystems. The pervasiveness and openness of these systems poses security challenges that must also be managed. This course provides students with fundamentals about the management of the IT function in this context, strategies to help improve the value of IT for the organization, and the secure and ethical use of information and data from

information systems. The course represents the culmination and integration of prior knowledge gained in the business and BIS curriculum.

Complete One Elective

Business Analytics for Security Management (BIS 345)

Overview of the process of business analysis. Data analytics have moved out of the academic world of statisticians to the practical world of technology. A variety of user-friendly technologies bring powerful analytical capabilities to end users. Three major areas that comprise analytics are reporting, visualization and prediction. This course uses the latest in technology to show the practice of data analytics in the real world. You will experience practical applications of analytics through guided exercises and case studies.

Topics in Business Information Systems and Security Management (BIS 490)

Study of various aspects of functional areas of business information systems. Topics vary depending on faculty and student interests. May be repeated for credit of the topics differ.

Intro to Problem-Solving using Computer Programming (COS 125)

An introduction to computer science through problem solving and computer programming. Topics include variable and operators, control logic, functions, strings, loops, input/output, and recursion. Programming concepts covered by this course include modularity, abstraction, top-down design, specifications, documentation, debugging, and testing. No prior programming experience is expected. Required for majors.

Security Policy and Governance ISS 240 – UMA

The course includes a discussion on security policies that can be used to help protect and maintain a network, such as password policy, e-mail policy and Internet policy. The course includes how to create a compliance program within an organization to monitor policies. The issues include organizational behavior and crisis management.

Cyber Law ISS 334 - UMA

This course is designed to enable students to concentrate on the legal issues and challenges that the changes in technology have created. Crimes such as identity theft, fraud, software protection, property rights violations and online staling will be explored. This course will examine how laws expanded and changed to account for the increase of crimes in the digital age.

Cyber Law Policies and Ethics ITT 451 (USM)

This course introduces aspects of cybersecurity laws and policies to integrate these challenges into cyber planning, operations, and strategy. The class will explore privacy issues, legal considerations, codes of ethics, and ethical implications faced by cybersecurity professionals. Topics align to the Department of Homeland Security (DHS) organizational security knowledge area covering security laws, regulations, and regulatory standards such as the International Organization for Standardization (ISO). Students will analyze organizations to develop security profiles for public and private entities. The intent is to develop understanding as a security professional of governances and how they convey compliances to business verticals such as healthcare and eCommerce.

Python Programming COS 184 (USM)

This course is a fast-paced introduction to computer programming for solving practical problems, taught in Python, a modern object-oriented dynamic computer language. It is also appropriate for students who have some programming background and want to pick up Python. The course format is live online with Zoom meetings, recorded for later review. There is a "lab" in which pairs of students tackle predefined lab-specific assignments. The course teaches how to represent aggregates of data, process data selectively and repetitively, structure programs with functions and use predefined libraries with an eye towards acquiring, managing, visualizing and performing basic analysis of sets of data. Lots of hands-on programming, both individually and with a partner.

Change Management BUS 240 (UMPI)

This course will analyze the forces that drive organizations to change, examine impediments to change, and survey a range of approaches for making organizational change more effective. This course provides practical skills for managing and leading change in your personal life and within any organization.

University of Maine System Board of Trustees

AGENDA ITEM SUMMARY

NAME OF ITEM: New Academic Program Proposal: B.S. Industrial Engineering, UMS

INITIATED BY: David M. MacMahon, Chair

BOARD INFORMATION:

BOARD ACTION: X

BOARD POLICY: 305.1 Program Approval, Review & Elimination Procedures

UNIFIED ACCREDITATION CONNECTION:

N/A

BACKGROUND:

The University of Southern Maine (USM) is seeking permission to offer a Bachelor of Science in Industrial Engineering.

As described in the included proposal from USM, this undergraduate program is designed to address demand for industrial engineering professionals within the State of Maine. We will accomplish this goal by providing an accredited educational program that will graduate future leaders in engineering, business and systems optimization that can sustain Maine's growing industrial sectors. Graduates will be able to solve complex problems in current and emerging industries of importance to Maine's economy including healthcare, manufacturing, business logics, transportation and tourism. The program will seek ABET accreditation within six years of program inception.

The proposal was reviewed at all appropriate faculty and administrative levels at UMS and was reviewed and subsequently recommended by the Chief Academic Officers Council. Dr. Robert Placido, Vice Chancellor of Academic Affairs recommended the program to the Chancellor. Chancellor Malloy signed his approval of the Bachelor of Science in Industrial Engineering on September 15, 2022.

TEXT OF PROPOSED RESOLUTION:

That the Academic and Student Affairs Committee forwards this item to the Consent Agenda at the November 13-14, 2022 Board of Trustees meeting for approval of the following resolution:

That the Board of Trustees accepts the recommendation of the Academic and Student Affairs Committee, and approves the Bachelor of Science in Industrial Engineering at the University of Southern Maine at Portland.



Vice Chancellor for Academic Affairs 15 Estabrooke Drive Orono, ME 04469

Date: October 5, 2022

Tel: 207-973-3211 Fax: 207-581-9212 www.maine.edu To: Dannel Malloy, Chancellor University of Maine System (UMS)

From: Robert Placido, VCAA

RAP

Regarding: USM Program Proposal: B.S. In Industrial Engineering

The University of Maine

University of Maine at Augusta

University of Maine at Farmington

University of Maine at Fort Kent

University of Maine at Machias

University of Maine at Presque isle

> University of Southern Maine

Please find the attached program proposal from the University of Southern Maine to offer the B.S. In Industrial Engineering. The attached material includes documentation of university level support including approval from President Jaqueline Edmondson as well as the full program proposal.

The proposed suspension of the B.S. In Industrial Engineering was reviewed and recommended by the Chief Academic Officer's Council (CAOC) on September 15, 2022. I also recommend this program for your approval.

l approve	I do not approve for the reasons listed below	Additional information needed for decision	Action
V			Recommend the USM BS Industrial Engineering

Chancellor Dannel

Dat



UNIVERSITY OF MAINE SYSTEM

PROGRAM PROPOSAL



Bachelor of Science in Industrial Engineering

University of Southern Maine

Submitted By:

Scott J. Eaton, PhD University of Southern Maine Department of Engineering Email: scott.eaton@maine.edu

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Amarpreet Kohli, PhD University of Southern Maine School of Business Email: amarpreet.kohli@maine.edu

September, 2022

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PROGRAM OBJECTIVES

This proposal seeks to create a new **Industrial Engineering** degree program culminating in a **Bachelor of Science in Industrial Engineering**. The broad goal of the Industrial Engineering program is to address demand for industrial engineering professionals within the State of Maine. We will accomplish this goal by providing an accredited educational program that will graduate future leaders in engineering, business and systems optimization that can sustain Maine's growing industrial sectors. Our graduates will be able to solve complex problems in current and emerging industries of importance to Maine's economy including healthcare, manufacturing, business logics, transportation and tourism. The Industrial Engineering program will build upon the strong foundation of our existing industrial engineering concentration within the mechanical engineering program to provide focused training in operations research, systems modeling, statistics and management.

This proposal is a collaboration between various department and individuals across the University of Southern Maine and is vetted by established professionals within industrial and systems engineering programs nationally, including Ohio University, Roger Williams University and the University of Maine. The industrial engineering program will build on the established record of excellence of USM's Department of Engineering and capitalize on the common core established within the mechanical engineering and electrical and computer engineering programs. The program will seek ABET accreditation within six years of program inception.

RATIONALE

The industrial engineering program will directly address the growing demand for industrial, systems and manufacturing job placements in Maine and the New England region. Recent research by Burning Glass Analytics has shown that industrial engineering job openings in Maine have risen 24% over 2015 levels and are expected to grow an additional 7% over the next 6 years. This growth rate outpaces the entire New England region.¹ Demand is expected to remain strong as the U.S. emerges into the post-COVID economy where emphasis on supply chain resiliency and a cohesive systems thinking approach to modern industry are highly valued.

The program will also contribute to the goals outlined in the Maine Department for Economic and Community Development's Maine Economic Development Strategy 2020-2029 to grow local talent and attract new talent to Maine, especially around innovation in target technology sectors of biotechnology and manufacturing.² As such, industrial engineering has been highlighted in the Harold Alfond Foundation's prospectus agreement Revitalizing the University of Maine System, which states "The University of Maine and the University of Southern Maine...are committed to growing engineering for Maine, ..., including, for

¹ Emsi Burning Glass Market Analytics "Industrial Engineering" (2021). Retrieved from: <u>https://www.emsibg.com</u>

² Maine Department of Economic and Community Development, Maine Economic Development Strategy 2020-2029, a focus on Talent and Innovation (2019). Retrieved from: <u>www.mainestrategicplan.com</u>

instance, building a much-needed program in Industrial Engineering at USM".³ This new program will strengthen USM's mission by providing high-quality education that will directly benefit the State and the companies within.

PROGRAM GOALS

The proposed program directly addresses the growing demand for industrial, systems and manufacturing engineers in Maine and the New England region. The envisioned program is designed to offer a modern, generalist, curriculum in industrial engineering that prepares students to enter a wide variety of careers of importance to the Maine economy and its businesses now and into the future. Graduates will show evidence of the following traits in 3-5 years of establishment:

1. **Proficient Engineers:** Successful in solving current and future industrial problems as evidenced by their career advancement.

Graduates of the industrial engineering program will acquire the skills required, both technical and managerial, to become leaders in their parent organizations. The program will sustain national accreditation to ensure modern competencies. Graduates will be assessed on their job advancement status post-graduation.

2. Industrious: Early in their career, acquire varied positions in a broad array of industries or graduate school as evidenced by their job/university placements, or through their entrepreneurial activities.

Program alumni will be surveyed for time seeking employment post-graduation and the industry sectors entered into. Records will be maintained at the Department of Engineering. The program data will be internally evaluated yearly by the faculty and engineering advisory board to assess placement rates and the diversity of industry sectors.

STUDENT OUTCOMES

Graduates of the industrial engineering program will be provided a rigorous undergraduate education preparing them for success in meeting existing and future challenges across a diversity of industries. The program provides foundational coursework in engineering science, mathematics, statistics, the sciences, communications, and business while holding true to the University of Southern Maine's core curriculum values of being world-minded and intentional life-long learners. The program offers generalized studies in

³ University of Southern Maine Office of Public Affairs (October 8, 2020). Retrieved from:

https://usm.maine.edu/public affairs/harold-alfond-foundation-has-made-historic-commitment-240-million-university-maine

industrial engineering, preparing graduates for workforce placement and graduate education. Graduates will be leaders, problem solvers and excellent communicators to their peers and the public.

Graduates of the program will be expected to:

- 1. Design a system or process to meet requirements within economic, social and physical constraints.
- Identify, formulate, and communicate complex industrial problems and their solutions to a community of their peers and the general public.
- 3. Function on, and lead, multidisciplinary teams to meet project objectives.
- 4. Manage the scope, cost, timing and quality to successfully complete projects for stakeholders.

EVIDENCE OF PROGRAM NEED

Industrial Engineering is a field with a particularly high unmet need in Maine, the New England region and at a national level. Industrial engineers focus on system efficiency, which applies broadly to production, manufacturing, healthcare, supply chain logistics, tourism and capital projects. They connect workers, materials, technology, and information in cost-effective and sophisticated ways. They are versatile engineers with the ability to work in a diversity of industries.

As the U.S. and the world rebuild supply chains in the post pandemic economic emergence, industrial engineers are expected to play an increasingly important role as the global economy undergoes convergence to *Industry 4.0*, a term popularized by engineer Klaus Schwab. During this convergence, increased joining of automation, artificial intelligence, machine-to-machine communication and industry are expected to rapidly shift technology, industries and social patterns. The United Nations Conference on Trade and Development (UNCTAD) stated that global investments in robotics-enabled automation, enhanced supply-chain digitization and additive manufacturing will shape international production going forward.⁴ International investments of US\$137 billion were made in Southeast Asian nations alone in 2020 for Industry 4.0 preparedness.⁵ For the U.S., New England and Maine to keep pace and participate in the future industrial economy, industrial engineering presence in Maine is highly desirable. Below are national, regional and state level data that provides compelling evidence of need for industrial engineers.

⁴ United Nations Conference on Trade and Development, World Investment Report 2020: International Production Beyond the Pandemic (2020). Retrieved from: https://unctad.org/webflyer/world-investment-report-2020

⁵ Association of Southeast Asian Nations, ASEAN Investment Report 2020-2021: Investing in Industry 4.0. Retrieved from https://unctad.org/publications-search?f%5b0%5d=product%3A584

NATIONAL DATA

The U.S. Department of Labor determined there were 292,000 jobs in industrial engineering in 2021.⁶ These jobs had a median pay of \$95,300 per year and a mean salary of \$78,000 per year. The national industrial engineering demand is anticipated to grow by 14% over the next eight years, which is much faster than average growth across all sectors. This growth translates into an additional 40,000 new jobs that require a bachelor's degree in industrial, systems or manufacturing engineering or a closely related field. This new demand is in addition to the expected 23,300 job openings expected to be created due to retirements and career changes over the same period of time.

To meet this demand, the U.S. graduated approximately 5,817 baccalaureate industrial engineers into the workforce in 2021, far below demand figures nationally.⁷ As such, industrial engineers are commonly recruited from other majors, such as mechanical or electrical engineering to fill the gap. Burning Glass Analytics reports that 90% of all industrial engineering related job postings require a bachelor's degree, while 25% advertise up to a master's degree.⁸ The majority of jobs are advertised within the manufacturing sector (53%), while services, financial and information sciences account for a combined 26%. Interestingly, 22% of jobs are non-categorized indicating the diversity of career opportunities for industrial engineers in the workplace.

Common job titles recruiting industrial engineering majors nationally are manufacturing engineer (8,609 postings), quality engineer (7,655 postings), production manager (5,809 postings), site reliability engineer (3,243 postings), project engineer (3,429 postings) and industrial engineer (2,284 postings). The principal employers of industrial engineers are just as diverse as the job titles as see in the following list: Boeing Company (8,336 postings), Raytheon (4,551 postings), Actalent (3,031 postings), Anthem Blue Cross (2,585 postings), Capital One (2,371 postings) and Intel Corporation (1,814 postings). Employers operate in a diversity of economic sectors including manufacturing, defense, professional services, healthcare, insurance and finance.

NEW ENGLAND REGION DATA

There are only nine industrial engineering programs in New England (compared to 29 mechanical engineering and 21 civil engineering programs), none of which are in the Northern New England states of Maine, Vermont, and New Hampshire. Collectively the nine New England colleges conferred 220 industrial engineering bachelor's degrees in 2021. In contrast, the New England region is home to an estimated

⁶ U.S. Bureau of Labor Statistics, Occupational Outlook Handbook: Industrial Engineers (2021). Retrieved from: https://www.bls.gov/ooh/architecture-and-engineering/industrial-engineers.htm

⁷ College Factual website statistics (2022). Retrieved from: https://www.collegefactual.com/majors/engineering/ieindustrial-engineering/rankings/highest-paid-grads/

⁸ Emsi Burning Glass Market Analytics "Industrial Engineering" (2021). Retrieved from: <u>https://www.emsibg.com</u>



Figure 1: Employment data for total number of industrial engineering related careers in the New England region. Data between years 2020 and 2030 are projected figures. (Source: Emsi Burning Glass Market Analysis, 2021)

78,438 related jobs and saw a total of 33,658 industrial engineering related job postings in the same period. Burning Glass Analytics further projects a 10.7% increase in job openings through 2030 totaling 8,511 new jobs. The career outlook for industrial engineers is strong as shown in the employment figures presented in Figure 1 for the New England region.

Job postings for industrial engineers in the New England region are principally in the manufacturing sector (58%), with services, financial and information sciences account for a combined 26%. As with national data, a large fraction (16%) of all jobs are uncategorized. Primary job titles were for manufacturing engineers (668 postings), quality engineers (651 postings), production engineers (295 postings) and project engineers (182 postings). Major employers in the region are Raytheon (1,182 postings), Humana (278 postings), Medtronic (256 postings), Takeda Pharmaceuticals (239 postings), Capital One (231 postings) and Dell (228 postings). Approximately 91% of the job postings required a bachelor's degree.

STATE DATA

The USM Department of Engineering is dedicated to meeting the workforce needs of Greater Portland, Maine's largest and fastest growing metropolitan area. Its location gives it unique access to businesses and place-bound students who otherwise would be unable to study engineering. It cultivates students from Southern Maine Community College and other local sources.

In February 2017, USM administrators and engineering faculty convened a group of Southern Maine's largest employers of engineers, including Bath Iron Works, Pratt & Whitney, IDEXX, and S. D. Warren. They asked about the companies' current and future workforce needs, and how USM could help meet them. The feedback was clear: **"There is a lack of qualified people."** Employers reported taking months to find the right candidates and recruiting from out-of-state universities, particularly Massachusetts.

Maine industry leaders say they highly value the skills of industrial engineers. The Manufacturers Association of Maine reports that the most common request for consulting services is for industrial engineers (see attached letter of support in Appendix A). This demand is expected to grow as Maine companies continue to modernize, and sectors outside of manufacturing, such as healthcare, transportation/logistics or food retail, and tourism seek greater efficiency in their operations.

Burning Glass analytics have shown a total of 807 job postings for industrial engineers in Maine during the period from May 2021 to April 2022. They expected an average growth rate of 23% over the next 10 years. Of these jobs, 90% sought baccalaureate degrees. Maine's high growth rate is expected to far outpace the average growth rate for industrial engineers nationally at 1.23%. In addition, these engineers typically obtain high average starting wages (\$74,000/yr.) and become employed primarily by Maine's largest employers within healthcare, retail and manufacturing. Currently all of Maine's industrial engineers are recruited from out-of-state or are being filled by non-industrial engineers.

The largest advertising employers for industrial engineers in Maine in 2021 are Raytheon (47 postings), Humana (39 postings), Abbott Laboratories (23 postings), Pratt & Whitney (18 postings), IDEXX Laboratories (16 postings) and General Dynamics (14 postings). These jobs are primarily in the manufacturing sector (49%), but a significant fraction lay in the services, financial and information sciences, which combine for 37%.

The University of Southern Maine is well positioned to deliver an impactful degree program in industrial engineering. Located within the Portland metroplex area, the University is located within 25 miles of a majority of the State's largest employers including General Dynamics, IDEXX Laboratories, L.L.-Bean, MaineHealth, UNUM, Alere, among others as shown in Figure 2. The Portland metroplex is the economic engine of the State. Cumberland County alone produces over 35% of the economic output of the State



Figure 2: Map detailing the geographic locations of Maine's 18 largest employers with headquarters in Maine.⁹

equating to \$10.2 billion dollars annually.¹⁰ York County accounts for an additional 12.3% of economic output and Androscoggin county 7.8% (Figure 3). Together, these 3 southern Maine counties account for over half of all Maine economic output. USM can build from its existing relationship with area employers to accelerate job placements for industrial engineering graduates in Maine.

⁹ Maine Center for Workforce Research and Information, Top Private Employers in Maine by Average Monthly Employment (2022). Retrieved from: https://www.maine.gov/labor/cwri/qcew3.html

¹⁰ Maine Center for Workforce Research and Information, County Profiles (2022). Retrieved from: https://www.maine.gov/labor/cwri/county-economic-profiles/countyProfiles.html



Figure 3: Map showing the distribution of Maine's economic output by county. The southern counties of York, Cumberland and Androscoggin account for over 50% total GDP.

LOCAL DATA

Southern Maine businesses that employ engineers have repeatedly expressed to USM their need for more workers; their inability to find employees may be affecting the pace of growth in the region. Greater Portland is Maine's urban economic engine, generating nearly half of the state's gross domestic product (GDP). In 2020, the Portland metroplex generated \$34.4B compared to the State's \$69.3B¹¹. By nearly every measure, this geographically small region generates an outsized amount of activity.

Two measures highlight the level of engineering activity in Greater Portland. GDP from engineering establishments alone is not available (and does not include the contributions of engineers in other industries) but is available for professional, scientific, and technical services, where 40% of engineers work. The table below shows that two-thirds (65%) of Maine's activity in that broad industry occurs in Greater Portland. Additionally, 43% of engineering jobs are in Greater Portland and just 11% of engineering degrees are awarded there.

¹¹ Fred Economic Data, Gross Domestic Product: All Industry Total in Maine (2022). Retrieved from: https://fred.stlouisfed.org/series/MENGSP



Figure 4: Chart detailing demographic and economic data comparing the Portland metroplex area to the remaining State. <u>Source:</u> U.S. Census Bureau, American Community Survey, 2011-2015 five-year average population for Maine and Portland-South Portland MSA; U.S. Bureau of Economic Analysis, Personal Income (2015) and Gross Domestic Product (2016) for Maine and Portland-South Portland MSA; U.S. Bureau of Labor Statistics, Occupational Employment Statistics jobs by occupation in Maine and Portland-South Portland MSA (May 2016); National Center for Educational Statistics, engineering bachelor's and graduate degrees conferred (2015-2016)

SIMILAR PROGRAMS

We have identified a total of 156 colleges and universities nationally that offer undergraduate degrees in industrial engineering (IE, 99 total) and the closely related programs of systems engineering (SE, 31 total) or manufacturing engineering (ME, 26 total). The majority of these colleges are located in urban and manufacturing centers including California, Texas, Ohio and Michigan (Figure 5). Notably, there is an absence of programs in northern New England and the western states of Idaho, Wyoming, Nevada and Utah. The combined population of the northern New England region is estimated to be 3.38 million people, all of whom have no in-State access to industrial engineering education. In preparing this proposal, we performed a detailed survey of curriculum from 14 Universities from across the U.S. as presented in Appendix B.

The closest program to the Portland metroplex area is University of Massachusetts – Lowell located 100 miles away. This program was newly established in 2020 to meet the growing demand for industrial engineers in the region. It offers undergraduate and graduate degrees and is currently housed with the mechanical engineering department. The program is focused on manufacturing engineering with 15 credits focused on machining automation and manufacturing systems. Given the programs specialization in manufacturing engineering, it is categorized as a destination school for students targeting that industry and

is in stark contrast the envisioned industrial engineering proposed at USM, which offers a generalist approach emphasizing modern systems engineering with applications to manufacturing, but also to healthcare, business logistics and tourism.



Figure 5: Color map of the lower 48 U.S. States showing the density of programs in either industrial, systems or manufacturing engineering.

Massachusetts is the only State in New England with more than one industrial engineering program. The other institutions, in addition to UMass – Lowell, are Northeastern (IE), UMass – Amherst (IE), Western New England University (IE), Massachusetts Institute of Technology (IE,ME,SE) and Worchester Polytechnic Institute (ME & IE). Most of these programs offer their industrial engineering degree programs either directly through the mechanical engineering department or in close collaboration with that department. This approach is similar to the envisioned USM model which will keep industrial engineering within the general umbrella of the Department of Engineering.

PROGRAM CONTENT

The bachelor's degree in industrial engineering provides a modern program to address the current and future needs of industries, especially in Maine. The degree program focuses on foundational and practical skills suitable for direct entry-level professional workforce placement in a diversity of industrial fields, or to enter into graduate studies. Graduates will be capable of using modern software and analytical tools to solve complex problems in healthcare, manufacturing, business logistics and tourism. Students will further gain an appreciation for historical perspectives in industrial engineering and understand the vital role industrial engineers play in the nation's infrastructure.

The program builds heavily from existing courses at USM. Collaborations between the Department of Engineering, the School of Business and the Department of Mathematics and Statistics have developed a cross-cutting curriculum where students take targeted upper-level courses in mathematics and business (12 credits minimum) in addition to newly created industrial engineering courses (INE-designation, 15 credits minimum). As such, the total new faculty load and new course offerings can be minimized while affording the graduates a comprehensive industrial engineering experience.

Industrial engineers often work at the interface of humans and machines. Therefore, a practical understanding of human sociology, biomechanics and ergonomics is essential for success. The degree program requires the completion of Introduction to Sociology (SOC 100) as well as course work in engineering statics (MEE 150) and Human Factors (INE 362). The human and machine interface concepts are reinforced with a hands-on laboratory experience Work Design/Human Factors Laboratory (INE 369). Together, these courses lay the foundation for Facility Design (INE 461).

Industrial engineers are principally concerned with process efficiency and the reduction of waste. Therefore, graduates of the USM program will be provided skillsets in the utilization of software and analytical tools to optimize systems performance to reduce cost and time while maximizing value and quality. Students will develop a deep understanding of probability and statistical concepts and apply that knowledge to real world systems and data to make strategic planning and capital improvement decisions. Students will be required to take Probability and Statistics (MAT 380) and Engineering Statistics (EGN 481) as foundational courses in statistics. Students will apply this knowledge to develop Deterministic Models in Operations Research (MAT 366) and Systems Modeling and Simulation (MAT 383) to contextualize the use of mathematical tools in an industrial setting. Hands-on approaches to the minimization of waste and process control will be developed through application of Principles of Lean Six Sigma (INE 462) and the associated Lean Facility Inventory Laboratory (INE 469).

CATALOG DESCRIPTION: B.S. IN INDUSTRIAL ENGINEERING

The industrial engineering program provides a broad scientific and engineering design foundation to be successful in a variety of industrial pursuits including manufacturing, healthcare, transportation and logistics. The industrial engineer develops and maintains optimum systems to address complex industrial operations. The industrial engineer must be well versed in basic engineering science, math and statistics and have excellent communication skills.

The industrial engineering program will seek accreditation by the EAC (Engineering Accreditation Commission) of ABET (formerly the Accreditation Board for Engineering and Technology). Graduates of the program are prepared to:

1. Design a system or process to meet requirements within economic, social and physical constraints.

- 2. Identify, formulate, and communicate complex industrial problems and their solutions to a community of their peers and the general public.
- 3. Function on, and lead, multidisciplinary teams to meet project objectives.
- 4. Manage the scope, cost, timing and quality to successfully complete various projects for stakeholders.

PROGRAM REQUIREMENTS

The B.S. degree in industrial engineering requires 66.5 credits within the engineering core curriculum which includes basic engineering science, basic sciences, foundational mathematics and statistic courses, as well as USM's core curriculum requirements. Graduates will further complete 46 credits of industrial engineering core courses, plus 12 credits of approved technical electives totaling 58 credits. Total minimum course requirements to complete the industrial engineering degree program is 124.5 credits. A listing of required courses within the engineering core and industrial engineering core is provided below. Approved technical electives outside of the engineering degretment are also listed.

B.S. in Industrial Engineering

Total Credits – 124.5

Engineering Core Curriculum: 66.5 credits including

• •		•
ENG 100	3	College Writing
ENG 102	3	2 nd level writing requirement (prereq ENG 100)
PHY 121	4	General Physics 1 (coreq. MAT 152)
PHY 114	1	General Physics 1 lab
PHY 123	4	General Physics 2 (prereq. PHY 121)
PHY 116	1	General Physics 2 lab (prereq. PHY 121, PHY 114)
GEN EDx	3	USM Core: Cultural Interpretation (CI)
GEN EDx	3	USM Core: Diversity (Satisfied in conj. with CI)
EGN 182	1	Engineering Tools: Solidworks
EGN 18x	1	Engineering Tools elective
EGN 160	4	Introduction to C++ Programming
EGN 248	4	Introduction to Differential Equations and Linear Algebra (prereq. MAT 153)
EGN 304	3	Engineering Economics – USM Core: Ethical Inquiry (prereq. MAT 152)
EGN 401	3	Senior Design Project I (prereq. ITP 210, EGN 182, THE 170, EGN 304)
EGN 402	3	Senior Design Project II – USM Core: Capstone (prereq. EGN 401)
ELE 216	3	Circuits 1: Steady-State Analysis (prereq. PHY 123)
ELE 217	3	Circuits 2: System Dynamics (prereq. ELE 216)
ELE 219	1	Circuits Laboratory (prereq. ITP 210, coreq. ELE 217)
MAT 152	4	Calculus A – USM Core: Quantitative Reasoning
MAT 153	4	Calculus B (prereq. MAT 152)
MAT 380	3	Theory of Probability and Statistics (prereq. MAT 153)
ITP 210	3	Technical Writing – USM Core: 3 rd level writing requirement (prereq. ENG 100)
THE 170	3	Public Speaking – USM Core: Creative Expression
CHY 113	3	Principles of Chemistry I – USM Core: Science Exploration
CHY 114	1.5	Laboratory Techniques I – USM Core: Science Exploration

5.1

Industrial Engineering Core: 46 credits

EGN 184	1	Engineering Tools: Industrial Engineering
EGN 188	1	Engineering Tools: Machine Tools Processing
ITP 230/BUS 373	3	Project Management – USM Core: International (if ITP 230)
INE 461	3	Facility Design (prereq. INE 361, MAT 383)
INE 361	3	Work Design (prereq. EGN 184, MEE 150)
EGN 481	3	Engineering Statistics (prereq. (MAT 380)
MAT 145	3	Discrete Mathematics I (prereq. MAT 152)
MAT 366	3	Deterministic Models in Operations Research (prereq. EGN 248)
MAT 383	3	Systems Modeling and Simulation (prereq. MAT 380)
INE 462	3	Principles of Lean Six-Sigma (prereq. EGN 481)
INE 362	3	Human Factors (prereq. SOC 100, INE 361)
BUS 375	3	Production/Operations Management (prereq. MAT 380, EGN 304)
INE 469	1	Lean Facility Inventory Lab (prereq. INE 461, coreq. INE 462)
INE 369	1	Work Design/Human Factors Lab (prereq. INE 361, coreq. INE 362)
MEE 150	3	Applied Mechanics: Statics (prereq. PHY 121)
MEE 230	3	Thermodynamics 1: Laws and Properties (prereq. MAT 153, PHY 121)
EGN 260	3	Materials Science for Engineers (prereq. CHY 113, PHY 123, MAT 153)
SOC 100	3	Introduction to Sociology – USM Core: Socio-Cultural Analysis

Technical Electives: 12 Credits (chose 4 from the following pool)

Any	engineering	course	300	le'	vel	or	above	
		~	~					

MAT 461	3	Stochastic Modeling in Operations Research
MAT 496	3	Introduction to Data Science

- 3 3 STA 564 Queuing Networks
- BUS 372 Supply Chain Management
- 3 BUS 374 **Purchasing and Procurement**

Additional three credit electives relevant to industrial engineering and offered at the 300-level or higher may be considered based on additional program meetings and/or student request.

General Education Elective: 3 Credits (Recommended to choose 1 from the following pool to meet simultaneously the cultural interpretation and diversity requirements)

MUH 105	3	Multicultural Perspectives on American Popular Music and Jazz
WGS 201	3	Rethinking Gender and Culture

Grade Policy: Students must achieve a cumulative 2.0 grade point average (GPA) from all courses that count toward fulfillment of the major requirements. Students will be placed on academic probation for failure to maintain a minimum cumulative GPA of 2.0. Students failing to rectify the GPA deficiency within a one-year probation period will be removed from the B.S. in industrial engineering major. Upon rectifying the GPA deficiency, students can reapply for admission to the major.

Graduation Requirements: Students will graduate with a bachelor of science in industrial engineering when the following requirements are satisfied:

- Minimum cumulative GPA of 2.0
- Completion of all University of Southern Maine core curriculum requirements
- Minimum cumulative GPA of 2.0 within engineering courses •
- Completion of 124.5 credits •

Transfer Policy: The industrial engineering degree program will participate in the Maine Engineering Pathways Program, which allows program participants to study for one year towards an engineering

degree at a participating University of Maine System campus and then transfer to the University of Southern Maine. More information about the Maine Engineering Pathways Program can be found at the following weblink: https://usm.maine.edu/engineering/maine-engineering-pathways-program

Industrial engineering will also seek to complete a transfer articulation agreement with Southern Maine Community College (SMCC) for a 2+2 program resulting in a B.S. in industrial engineering from USM. SMCC currently offers an Associate of Science in Engineering, which satisfactorily prepares transfer students from SMCC to enter into the industrial engineering degree program at USM at the junior level. Transfer articulation agreements currently exist for the electrical, computer and mechanical engineering degree programs.

Admissions Information: No additional admissions criteria above existing USM policies are required.

COURSE DESCRIPTIONS

Seven new courses are required to complete the industrial engineering degree program. The courses have been identified through extensive discussions with program collaborators and review of competitor course listings. The following courses and descriptions represent a broad industrial engineering curriculum covering the fundamentals of the field and preparing students for advanced courses at the graduate level as well as a diversity of technical electives. Catalog course descriptions for each course are detailed below.

EGN 184 Engineering Tools: Industrial Engineering

An introduction to systems thinking and problem solving tools used in industry engineering. Spreadsheet design, calculation and data organization with applications to optimization, methods of analysis and system design. Basic database query, data mining, data visualization and reporting according to industry standards. Foundational concepts of Industrial Engineering are introduced to motivate skills learning. Cr. 1.

INE 361 Work Design

Work analysis and design to improve material handling systems for productivity, performance and safety. Pre-determined time systems, performance rating, work sampling and work flow. Motion and time studies using standard techniques in industrial engineering. Prerequisites: EGN 184, MEE 150. Cr. 3.

INE 362 Human Factors

A study of human-machine interaction and the accident cause-effect relationship. Physical ergonomics, cognitive ergonomics, macroergonomics and preventative care as they relate to workstations and process design. Safety decision-making analysis in consideration of legal, management and technical aspects of industrial safety. Prerequisites: SOC 100, INE 361. Cr. 3.

INE 369 Work Design and Human Factors Laboratory

Application of work design and human factors analysis in a laboratory setting. Methods of measurement and data analysis to aid the industrial design process. Prerequisite: INE 361; co-requisite: INE 362. Cr. 1.

INE 461 Facility Design

An introduction to the planning and design of facilities. Principles of management, facility organization and work environment planning. Capacity and technology selection, equipment and manpower requirements. Plant layout and support activities analysis including receiving, inventory management, material handling, warehousing and maintenance planning. Prerequisites: INE 361, MAT 383. Cr. 3.

INE 462 Principles of Lean Six Sigma

Fundamental concepts of lean six sigma for continuous improvement approaches in modern industries. Lean methods including value-steam mapping, control charting, continuous flow, Kanban and A3 will be developed. Basic techniques for statistically-based process improvement using the DMAIC process will be applied to real world situations. Prerequisites: EGN 481. Cr. 3

INE 469 Lean Facility Inventory Laboratory

Application of facility design and lean six sigma principles to real world data for continuous improvement. Prerequisites: INE 461; co-requisites: INE 462. Cr. 1.

INDUSTRIAL ENGINEERING COURSE SEQUENCE

Students are expected to complete the industrial engineering degree program within 4 years assuming fulltime enrollment. A recommended course sequence is provided in Table I below. The recommended course sequence has been developed to ensure all University of Southern Maine core curriculum requirements and course prerequisites are met, while adhering to established Department of Engineering core course offerings. The course sequence should not be considered a rigid requirement for the student. In fact, the industrial engineering core courses have a limited number of prerequisites which allows students great flexibility in their degree program to afford strategic enrollment in technical electives to meet their interests. A curriculum map of industrial engineering courses as they compare to the established programs in electrical and computer engineering as well as mechanical engineering is provided in Appendix C.

FRESHMAN Y	EAR .		
FALL SEMESTER		HOURS	NOTES
MAT 152	Calculus A	4	Quantitative Reasoning
PHY 121	General Physics 1	4	
PHY 114	General Physics 1 - Lab	1	
ENG 100	College Writing	3	Level 1 Writing
CHY 113	Principles of Chemistry 1	3	Scientific Exploration
CHY 114	Principles of Chemistry 1 - Lab	1.5	
SPRING SEMESTER		HOURS	NOTES
ENG 102	Academic Writing	3	Level 2 Writing
EGN 184	Engineering Tools: Industrial	1	
	Engineering		
PHY 123	General Physics 2	4	
PHY 116	General Physics 2 - Lab	1	
MAT 153	Calculus B	4	
ITP 210	Technical Writing	3	Level 3 Writing
SOPHOMORE	YEAR		

 Table I: Recommended course sequence for the completion of the industrial engineering degree program.

SOPHOMORE	YEAR		
FALL SEMESTER		HOURS	NOTES
EGN 160	Introduction to C++ Programming	4	
EGN 182	Engineering Tools: Solidworks	1	

MEE 150	Applied Mechanics: Statics	3	
MAT 145	Discrete Mathematics I	3	
ELE 216	Circuits I: Steady State Analysis	3	
SOC 100	Introduction to Sociology	3	Socio-Cultural Analysis
			<u>_</u>
SPRING SEMESTI	ER	HOURS	NOTES
EGN 248	Intro. Differential Eq. and Linear Alg.	4	
MAT 380	Theory of Probability and Statistics	3	
MEE 230	Thermodynamics I: Laws and	3	
	Properties		
ELE 217	Circuits 2: System Dynamics	3	
ELE 219	Circuits Laboratory	1	
EGN 188	Engineering Tools: Materials	1	
	Processing		
JUNIOR YEAH	<u> </u>		
FALL SEMESTER		HOURS	NOTES
THE 170	Public Speaking	3	Creative Expression
Technical Elective	Engineering Elective (>300 level)	3	-
INE 361	Work Design	3	
MAT 366	Deterministic Models in Operat.	3	
	Research		
GEN EDx.	General Education Elective	3	Cultural
			Interpretation/Diversity
SPRING SEMESTI	ER	HOURS	NOTES
Technical Elective	Engineering Elective (>300 level)	3	
ITP 230(/BUS	Project Management	3	International (If ITP 230)
373)			
373) MAT 383	Systems Modeling and Simulation	3	
373) MAT 383 INE 362	Systems Modeling and Simulation Human Factors	3	
373) MAT 383 INE 362 INE 369	Systems Modeling and Simulation Human Factors Human Factors/Work Design Lab	3 3 1	
373) MAT 383 INE 362 INE 369 EGN 304	Systems Modeling and Simulation Human Factors Human Factors/Work Design Lab Engineering Economics	3 3 1 3	Ethical Inquiry
373) MAT 383 INE 362 INE 369 EGN 304 SENIOR YEAR	Systems Modeling and Simulation Human Factors Human Factors/Work Design Lab Engineering Economics	3 3 1 3	Ethical Inquiry
373) MAT 383 INE 362 INE 369 EGN 304 SENIOR YEAF FALL SEMESTER	Systems Modeling and Simulation Human Factors Human Factors/Work Design Lab Engineering Economics	3 3 1 3 HOURS	Ethical Inquiry NOTES
373) MAT 383 INE 362 INE 369 EGN 304 SENIOR YEAF FALL SEMESTER EGN 401	Systems Modeling and Simulation Human Factors Human Factors/Work Design Lab Engineering Economics Senior Design Project I	3 3 1 3 HOURS 3	Ethical Inquiry NOTES
373) MAT 383 INE 362 INE 369 EGN 304 SENIOR YEAF FALL SEMESTER EGN 401 INE 461	Systems Modeling and Simulation Human Factors Human Factors/Work Design Lab Engineering Economics Senior Design Project I Facility Design	3 3 1 3 HOURS 3 3	Ethical Inquiry NOTES
373) MAT 383 INE 362 INE 369 EGN 304 SENIOR YEAF FALL SEMESTER EGN 401 INE 461 EGN 260	Systems Modeling and Simulation Human Factors Human Factors/Work Design Lab Engineering Economics Senior Design Project I Facility Design Material Science for Engineers	3 3 1 3 HOURS 3 3 3 3	Ethical Inquiry NOTES
373) MAT 383 INE 362 INE 369 EGN 304 SENIOR YEAF FALL SEMESTER EGN 401 INE 461 EGN 260 EGN 481	Systems Modeling and Simulation Human Factors Human Factors/Work Design Lab Engineering Economics Senior Design Project I Facility Design Material Science for Engineers Engineering Statistics	3 3 1 3 HOURS 3 3 3 3 3 3	Ethical Inquiry NOTES
373) MAT 383 INE 362 INE 369 EGN 304 SENIOR YEAH FALL SEMESTER EGN 401 INE 461 EGN 260 EGN 481 Technical Elective	Systems Modeling and Simulation Human Factors Human Factors/Work Design Lab Engineering Economics Senior Design Project I Facility Design Material Science for Engineers Engineering Statistics Engineering Elective (>300)	3 3 1 3 HOURS 3 3 3 3 3 3 3 3 3	Ethical Inquiry NOTES
373) MAT 383 INE 362 INE 369 EGN 304 SENIOR YEAF FALL SEMESTER EGN 401 INE 461 EGN 260 EGN 481 Technical Elective	Systems Modeling and Simulation Human Factors Human Factors/Work Design Lab Engineering Economics Senior Design Project I Facility Design Material Science for Engineers Engineering Statistics Engineering Elective (>300)	3 3 1 3 HOURS 3 3 3 3 3 3 3 3	Ethical Inquiry NOTES
373) MAT 383 INE 362 INE 369 EGN 304 SENIOR YEAF FALL SEMESTER EGN 401 INE 461 EGN 260 EGN 481 Technical Elective	Systems Modeling and Simulation Human Factors Human Factors/Work Design Lab Engineering Economics Senior Design Project I Facility Design Material Science for Engineers Engineering Statistics Engineering Elective (>300)	3 3 1 3 HOURS 3 3 3 3 3 3 3 HOURS	Ethical Inquiry NOTES
373) MAT 383 INE 362 INE 369 EGN 304 SENIOR YEAR FALL SEMESTER EGN 401 INE 461 EGN 260 EGN 481 Technical Elective SPRING SEMESTI EGN 402	Systems Modeling and Simulation Human Factors Human Factors/Work Design Lab Engineering Economics Senior Design Project I Facility Design Material Science for Engineers Engineering Statistics Engineering Elective (>300)	3 3 1 3 HOURS 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	Ethical Inquiry NOTES NOTES Capstone
373) MAT 383 INE 362 INE 369 EGN 304 SENIOR YEAH FALL SEMESTER EGN 401 INE 461 EGN 260 EGN 481 Technical Elective SPRING SEMESTI EGN 402 INE 462	Systems Modeling and Simulation Human Factors Human Factors/Work Design Lab Engineering Economics Senior Design Project I Facility Design Material Science for Engineers Engineering Statistics Engineering Elective (>300) ER Senior Design Project II Principles of Lean Six Sigma	3 3 1 3 HOURS 3 3 3 3 3 3 3 HOURS 3 3 3	Ethical Inquiry NOTES NOTES Capstone
373) MAT 383 INE 362 INE 369 EGN 304 SENIOR YEAF FALL SEMESTER EGN 401 INE 461 EGN 260 EGN 481 Technical Elective SPRING SEMESTI EGN 402 INE 462 INE 469	Systems Modeling and Simulation Human Factors Human Factors/Work Design Lab Engineering Economics Senior Design Project I Facility Design Material Science for Engineers Engineering Statistics Engineering Elective (>300) ER Senior Design Project II Principles of Lean Six Sigma Lean Facility/Inventory Lab	3 3 1 3 HOURS 3 3 3 3 3 HOURS 3 3 1	Ethical Inquiry NOTES NOTES Capstone
373) MAT 383 INE 362 INE 369 EGN 304 SENIOR YEAF FALL SEMESTER EGN 401 INE 461 EGN 260 EGN 481 Technical Elective SPRING SEMESTI EGN 402 INE 469 BUS 375	Systems Modeling and Simulation Human Factors Human Factors/Work Design Lab Engineering Economics Senior Design Project I Facility Design Material Science for Engineers Engineering Statistics Engineering Elective (>300) ER Senior Design Project II Principles of Lean Six Sigma Lean Facility/Inventory Lab Production/Operations Management	3 3 1 3 HOURS 3 3 3 3 3 3 3 HOURS 3 1 1 3	Ethical Inquiry NOTES NOTES Capstone
373) MAT 383 INE 362 INE 369 EGN 304 SENIOR YEAF FALL SEMESTER EGN 401 INE 461 EGN 260 EGN 481 Technical Elective SPRING SEMESTI EGN 402 INE 462 INE 469 BUS 375 Technical Elective	Systems Modeling and Simulation Human Factors Human Factors/Work Design Lab Engineering Economics Senior Design Project I Facility Design Material Science for Engineers Engineering Statistics Engineering Elective (>300) ER Senior Design Project II Principles of Lean Six Sigma Lean Facility/Inventory Lab Production/Operations Management Engineering Elective (>300)	3 3 1 3 HOURS 3 3 3 3 3 3 3 HOURS 3 3 1 1 3 3 3	Ethical Inquiry NOTES NOTES Capstone

PROGRAM RESOURCES

The industrial engineering program has received considerable interest from faculty across the University of Southern Maine, the University of Maine System and external collaborators. Below is a list of individuals who have been consulted in the preparation of this program proposal and expressed interest in supporting the development of the new major. They include a working group housed within the Department of Engineering, which includes faculty from the USM School of Business, the Department of Mathematics and Statistics as well as external faculty from the University of Maine – Orono, Roger Williams University and Ohio University. A compilation of Curriculum Vitae for all industrial engineering program developers is provided in Appendix D.

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Dr. Muhammad El-Taha, Professor of Operations Research, Department of Mathematics and Statistics, College of Science, Technology, and Health, Portland. Email: <u>el-taha@maine.edu</u>, Phone: 207-780-4564.

Dr. Dušan Šormaz; Professor and Undergraduate Chair, Department of Industrial and Systems Engineering, Stocker Center 284, Ohio University, Russ College of Engineering and Technology, Athens OH. Email: sormaz@ohio.edu, Phone: 740-593-1545.

Dr. Bashir Khoda, Assistant Professor of Mechanical Engineering, Department of Mechanical Engineering, 208 Boardman Hall, University of Maine, College of Engineering, Orono ME. Email: <u>bashir.khoda@maine.edu</u>, Phone: 207-581-5183.

Dr. Andrew Schoenberg, Part-Time Professor of Engineering, Department of Engineering, 149 John Mitchell Center, College of Science, Technology, and Health, Gorham. Email: <u>andrew.schoenberg@maine.edu</u>, Phone: 207-780-4743.

Dr. Linda Ann Riley. Roger Williams University (Retired) and Part-Time Professor of Engineering, Department of Engineering, 149 John Mitchell Center, College of Science, Technology, and Health, Gorham. Email: <u>linda.riley@maine.edu</u>, Phone: 207-780-5287.

Dr. Ivan Most, Part-Time Associate Professor of Mechanical Engineering, 149 John Mitchell Center, College of Science, Technology, and Health, Gorham. Email: ivan.most@maine.edu, Phone: 207-780-5287.

Dr. Mustafa Guvench, Professor of Electrical Engineering, Department of Engineering, 123 John Mitchell Center, College of Science, Technology, and Health, Gorham, Email: <u>guvench@maine.edu</u>, Phone: 207-780-5581.

The program committee has also been in communication with a number of industrial partners regarding establishment of the program, and we received positive feedback and letters of support (see Appendix A) from the organization and contacts listed below. Each person has expressed enthusiasm for future collaboration with the program and possible development of graduate and internship placements programs with USM.

Maureen Lafferty, VP – Talent, Development and HR Business Teams, L.L.Bean, Inc. Email: <u>mlafferty@llbean.com</u>

Lisa G. Martin, Executive Director, Manufacturers Association of Maine. Email: lisa@mainemfg.com

Susan Ahern, Vice President of Innovation, MaineHealth. Email: susan.ahern@mainehealth.com

Ryan McCauley, Quality Manager, Howell Laboratories Inc. Email: <u>rmmcauley@howelllabs.com</u>

LIBRARY

The library and other learning resources will be identical to those required for current students within the electrical and computer engineering and mechanical engineering programs. No additional library resources are expected to service the industrial engineering degree program.

EQUIPMENT

Existing equipment available to support the industrial engineering program is detailed below. In the Mechanics of Materials lab (JMC 184) and the Thermo-Fluids lab (JMC 190) equipment includes an Instron uniaxial tensile testing machine (60 kN load frame), a Charpy Impact testing machine for material testing and numerous PASCO data acquisition and monitoring components for independent laboratory

explorations. In the Electrical Power and Machinery laboratory (JMC 173) and Robotics and Intelligent Systems laboratory (JMC 165), equipment includes DC machines, DC dynamometers, AC synchronous machines, AC induction motors, assorted handheld components, as well as robotic equipment including a Rug Warrior mobile platform, 5-dof Microbot Teachmover (10 units), 6-dof Stäubli R60, a Pendubot, and 3 units of Adept-based Scara robots.

The JMC machine shop and skunk works have several machine tools including lathes, milling machines, saws, and a CNC machine. It is also equipped with a precision measuring machine. These facilities are used by students who work on their senior projects or term projects (EGN 401, EGN 402, and EGN 403). Additive manufacturing equipment in the JMC includes 1 large format printer, 1 Makerbot Z18 PLA 3D printer, 2 Lulzbot Taz 3D printers and 2 flashforge finder 3D printers.

The laboratories leveraged on the Portland Campus include the Composites Engineering Research Lab (CERL, in SCI 073 and 074, used for MEE 352 and EGN 482) and the Maker Innovation Studio (MIST, in SCI 571). The CERL space is equipped with a 100 KN load frame, Dynamic Mechanical Analyzer (DMA), rheometer, Thermo-Mechanical Analyzer (TMA), Differential Scanning Calorimeters (DSC), ThermoGravimetric Analyzer (TGA), a 3D optical profilometer, Fourier Transform Infrared Spectrometer (FTIR), grinder/polisher, goniometer, microscopes, and non-destructive IR imaging. The manufacturing capabilities at CERL include regular and vacuum ovens, thermoformer, and vacuum forming system. The MIST Fab-Lab includes equipment for 3D printing, CNC milling, laser cutters, vinyl cutters, digital embroidery machines, sewing machines, UV printer, sublimation printer, vacuum former, thermoformer, furnace, and power tools. MIST has a media lab that can be used for educational and information workshops. MIST also has a digital-immersion lab that includes an HTC vive, Occulus Quest, digital drawing tablets, Microsoft Hololens, and computers for game and app development. Furthermore, MIST has a SolidWorks professional license, which can be used for generating CAD drawings.

The existing equipment is adequate to service the industrial engineering program at its inception. Strategic investments in capital equipment are likely to be pursued beginning in years 3-5 under the guidance and recommendation of newly hired industrial engineering program faculty. Capital equipment expenses are budgeted in the Pro Forma section of this program proposal and are anticipated to be procured using departmental operational funds based on program revenue projections.

FACILITIES

The industrial engineering program will be located in the John Mitchell Center on USM's Gorham campus and will leverage existing laboratory spaces in the Science Building on the Portland campus. The John Mitchell Center is a 60,500 ft² building that houses the Departments of Engineering and Technology and select offices for the Department of Mathematics and Statistics. The Department of Engineering currently maintains six laboratory spaces suitable for the industrial engineering program. Specific laboratory space include the Thermo-Fluids Lab (JMC 190), the Circuits Lab (JMC 152), the Mechanics and Materials Lab (JMC 184) and JMC 164, 246 and 242. The Composites Engineering Research Labs (SCI 073 and 074) in the Science Building on the Portland campus are currently used for instruction in the Industrial Engineering concentration and will continue to be available to the degree program. Other open space available to 5.1

the Industrial Engineering program includes JMC 242 and JMC 119 and the back of JMC 181 for project work and faculty research.

The Department of Engineering also maintains a number of computer labs. The Computer Aided Design Lab (JMC 270), Thermo-Fluids lab (JMC 190), Circuits Lab (JMC 152), Mechanical Engineering Lab (JMC 184), and the CIE Lab (JMC 147) collectively support 68 desktop computers that can be used for classroom instruction, course projects and research. The computers are sufficient to initiate the Industrial Engineering program. The Department of Engineering currently maintains a number of engineering software site licenses including SolidWorks, Matlab, LabVIEW, Ansys, Mathematica, Microsoft Visio, Microsoft Project, among others, which can be utilized by the Industrial Engineering program.

The John Mitchell Center is also well equipped with instructional classrooms including 4 zoom-enabled classrooms and a 48 seat auditorium, which is sufficient to initiate the Industrial Engineering program due to the high number of engineering core courses that will be shared across the Engineering curricula.

COOPERATION WITH OTHER PROGRAMS

The industrial engineering degree program benefits from strong collaborations formed with departments across the University of Southern Maine campuses. As stated previously, the proposed industrial engineering program takes advantage of synergies from within the School of Business and the Department of Mathematics and Statistics to develop a modern industrial engineering curriculum with minimal new resources or courses requested. Below we outline the collaborations formed across the University of Southern Maine campuses and identify opportunities for cross-departmental scholarship and future curriculum development.

Strategic cooperation with the School of Business involves utilization of existing business courses as well as alignment of scholarship pursuits amongst the business and engineering faculty. Two faculty from the School of Business, Dr. Amapreet Kohli and Dr. Nihar Kumthekar, are both degree holding industrial engineers with deep knowledge and experience in the field. Two courses, Project Management (BUS 373) and Production/Operations Management (BUS 375) are required courses within the degree program as core industrial engineering courses. Additionally, a number of Business courses have been pre-approved as technical electives to the program; Supply Chain Management (BUS 372) and Purchasing and Procurement (BUS 384). Incorporation of these courses has been determined to be beneficial to both departments. Cross-department research and scholarship opportunities have further been identified. For example, Senior Design Project II (EGN 402) is a one semester course that is instructed by an engineering professor, but it accepts approved projects from supervisors, many of which are expected to originate from the School of Business faculty.

Within the Department of Mathematics and Statistics, Dr. Muhammad El-Taha has developed and regularly delivers courses in Deterministic Models in Operation Research (MAT 366) and Systems Modelling and Simulation (MAT 383). Each course will be a required component of the industrial engineering core curriculum. Discussions have indicated that existing enrollments in these classes can accommodate the addition of industrial engineering students through the first few years of the program

offering. Two additional courses Stochastic Modelling in Operations Research (MAT 461) and Introduction to Data Science (MAT 496) have also been pre-approved as technical electives in industrial engineering.

The program also benefits from strong relationships with the Department of Technology and the Department of Sociology. The Department of Technology regularly teaches courses in Technical Writing (ITP 210) which is currently taken by all engineering students in the electrical, computer and mechanical programs. Project Management (ITP 230) is an industrial engineering core course that will fulfill the international requirement of USM's core curriculum requirements. Each course (ITP 210 and 230) is currently offered each semester and has been confirmed by the Department Chair, Mark Monnin, to be able to accommodate the addition of industrial engineering students. Conversations with Dr. Wendy Chapkis, chair of the Department of Sociology, has confirmed that Introduction to Sociology (SOC 100) can also accommodate the addition of industrial engineering students and expressed enthusiasm for exploring additional scholarship and curriculum collaboration opportunities.

The industrial engineering program team has also communicated across all service departments to ensure existing course offerings and sections can adequately accommodate the anticipated new enrollments. The following list summarizes the departments and chairs who have been contacted. Each chair has communicated positively to the prospects of a new degree program in industrial engineering and has confirmed inclusion of new enrollments in the stated courses.

- Dr. Bruce MacLeod, Chair, Department of Computer Science (COS 160)
- Dr. Shelton Waldrep, Chair, Department of English (ENG 100, ENG 102)
- Dr. Meg Hausman, Chair, Department of Chemistry (CHY 113 and Lab)
- Prof. Sara Valentine, Chair, Department of Theatre (THE 170)
- Dr. Julie Ziffer, Chair, Department of Physics (PHY 121, PHY 123 and Labs)
- Dr. Silvia Valdes-Leon, Chair, Department of Mathematics and Statistics (MAT 152, MAT 153, MAT 380, MAT 145)

TOTAL FINANCIAL CONSIDERATION

The industrial engineering program will benefit from synergistic activities across the University of Southern Maine and from the existing infrastructure, faculty and staff within the College of Science, Technology, and Health and the Department of Engineering. The industrial engineering program will leverage many existing courses from within the Department of Engineering, Department of Mathematics and Statistics, Department of Technology and the School of Business. As a point of reference, of the 124.5 credits being recommended for the industrial engineering degree, all but 15 credits are from existing courses in the University catalog. The newly proposed industrial engineering courses are all listed as 300-level of higher and are intended for junior year students. As such, existing University faculty can successfully deliver the first two years of the industrial engineering curriculum serving as a bridge to establish the program and accept enrollments while the program recruits new faculty as the program grows.

New Personnel: Industrial engineering at USM is anticipated to be nationally accredited and a leading regional program. The industrial engineering faculty are expected to generate regionally recognized scholarship, develop strategic industrial relationships and provide a respected academic program

benefitting communities within Maine. To meet these goals, we anticipate adding <u>two</u> tenure-track faculty lines over the first five years of the program. These faculty will not only be responsible for the program execution and growth into the future, but are required positions to achieve ABET accreditation expected to take place in AY 27-28. The new faculty is expected to be 100% supported by enrollments gained over the first two years of program offerings. See the five year pro forma for specific details of costs and timing.

- Faculty Line #1 The first tenure-track faculty member will be recruited in a national search and ideally provide leadership for the program, teach courses broadly across the curriculum, advise students, and specialize or perform scholarship in either human factors or work design. The new faculty member will be recruited beginning in year two of the program with salary starting in year three.
- Faculty Line #2 The second tenure-track faculty member will be recruited in a national search and ideally teach courses broadly across the curriculum, advise students, and specialize or perform scholarship in either lean processes or facility design. The new faculty member will be recruited beginning in year three of the program with salary starting in year four.

Infrastructure: No additional infrastructure investments are required for the industrial engineering program. The John Mitchell Center on USM's Gorham campus currently houses the Department of Engineering, Department of Technology and portions of the Department of Mathematics and Statistics. The center houses numerous laboratories and classrooms (previously listed) that can be leveraged to meet the needs of the new industrial engineering program. Important classrooms include JMC 217 (lecture hall), JMC 252 (technology enabled classroom), JMC 181/185 (machine shop and manufacturing laboratories), JMC 270 (computer-aided design laboratory). The facilities are robust enough to accommodate new instruction requirements.

Staff: No additional staff are required for the industrial engineering program. The Department of Engineering currently employs three staff members and multiple student assistants annually to meet its work load. These staff are expected to be leveraged to meet the program needs from its inception through the five year start-up period. Future enrollments will determine the need for additional staff beyond the current projection. A list of existing staff resources is provided below.

- A full-time administrative assistant helps manage departmental operations, archive information and develop academic reports. The administrative assistant can be leveraged to support the industrial engineering program.
- A full-time mechanical technician responsible for all mechanical laboratory operations and maintenance. The position also provides safety and oversight to all spaces within the John Mitchell Center. The mechanical technician can be leveraged to support the establishment and operations of the industrial engineering laboratories.
- A part-time electrical technician who is responsible for electrical laboratory operations and maintenance. The staff member will be leveraged to supply electrical support to the industrial engineering program and laboratory spaces.

Additional Costs: In addition to the personnel costs, we expect to need funding for student undergraduate scholarships, accreditation expenses, and on-going marketing costs to promote the program.

FUNDING SOURCE(S)

The creation of the industrial engineering program at the University of Southern Maine is anticipated to be funded completely through enrollment tuition and fees. This is only possible due to the extensive synergistic infrastructure developed within the Department of Engineering and the cross-college collaborations formed with the School of Business and the Department of Mathematics and Statistics. The program expects to accept enrollments starting in Fall 2023. Students entering the industrial engineering program will be serviced by existing courses, resources and faculty through the Spring 2025 semester. Fall 2025 will be the first investment requirement for new faculty to provide the upper-level industrial engineering course offerings, at which time enrollment revenues are expected to cover new faculty line costs. The program is anticipated to be sustainable and cost neutral from its inception. Additional faculty lines will only be requested after student enrollments reach levels determined by financial standing of the program.

Although the program is expected to grow organically, faculty within the Department of Engineering, School of Business and Department of Mathematics and Statistics will continue to engage in external grant funding opportunities to accelerate program growth and capital investments. The program has identified numerous external funding opportunities within the Maine Technology Institute, National Science Foundation, Department of Education, Department of Transportation, and the Department of Defense that invest in educational program development and industrial engineering related research.

In addition, The University of Maine System was awarded \$240 million from the Harold Alfond Foundation in 2020. A portion of the funding, estimated to be \$75 million, establishes a new system-wide College of Engineering, Computing and Information Science (MCECIS). The proposed Industrial Engineering program at USM was specified in the Foundation announcement. Although details are still forthcoming, the degree planning committee believes additional internal funding is available to help defray program costs in the coming years.

5 YEAR PRO FORMA STATEMENT

A conservative revenue and cost projection worksheet has been developed based upon program growth projections and resource allocations described within this proposal. We anticipate new enrollments of 8 full-time and 2 part-time students beginning in AY 23-24 and growing to steady-state new full-time equivalent (FTE) enrollment of 21 per year by AY 27-28. A flat 15% attrition rate on enrollment is assumed based on previous departmental retention. The total enrollments will peak to 53 in AY 27-28 and is expected to grow through 2030. These new enrollment projections are supported by experience within the Department of Engineering during the inception of the mechanical engineering in 2009. The first graduating class of six students is expected in AY 26-27, which also coordinates with the ABET accreditation cycle in AY 27-28.

Revenue projections use the conservative assumption that all incoming students are in-State tuition payers with a non-inflationary cost of \$288 per credit hour. No revenue projections are included for on-campus living expenses or associated program fees. Full-time equivalent students are expected to enroll for an average of 15 credit hours in each semester and students matriculate on schedule through the program. Gross revenues from tuition equals \$77,760 in the program inception year and grows to \$457,920 in AY 27-28.

Expenses incurred include the recruitment (\$20,000 total), salaries and benefits of two new tenure-track faculty lines to support instruction and program growth. New faculty are anticipated to be hired at existing USM engineering faculty base rates and include a 3% COLA each year from AY 23-24. Faculty benefits are calculated using a flat 54.2% fringe rate based on salary. New faculty are anticipated to receive a start-up package of \$30,000 each in the first year of hire. No new staff are expected to be hired to support the program with the first 5 years, however, the program will make use of student assistants to help develop instructional tools and perform administrative support functions to meet program needs. A flat marketing expense of \$5,000 is budgeted each year of program operations to build website content, advertise to perspective students and attend engineering fairs across the State to recruit students and engage local businesses. Total expenses for program operations is expected to be \$34,000 in the inception year and grows to \$351,564 in year 5.

Net revenues are projected to be modest in the inception year at \$43,760, but grow to \$130,356 by year 5 of this analysis. The program is expected to remain net revenue positive throughout the 5 year period, despite the conservative revenue forecasting. The program in industrial engineering is expected to make a consistent positive impact on USM operations while meeting strategically important goals for the University of Maine System and the State of Maine. This result is directly attributed to the synergies that exist across the faculty, departments and colleges that are unique to USM.

	Academic Year					
	<u>23-24</u>	<u>24-25</u>	<u>25-26</u>	<u>26-27</u>	<u>27-28</u>	
Projected New Enrollment				25	25	
In-State Full-time	8	8	12	15	18	
In-State Part-time	2	3	4	5	6	
Total Enrollment FTE	9	18	30	43	53	
Revenue						
Estimated Tuition per credit hour	\$288	\$288	\$288	\$288	\$288	
Credits per student per year	30	30	30	30	30	
Total Revenue	\$77,760	\$155,520	\$259,200	\$371,520	\$457,920	
Expenses						
New FTE Faculty	0	0	1	1	0	
Total FTE Faculty	0	0	1	2	2	
Total New Faculty Salary	0	0	\$80,861	\$166,574	\$171,571	
Total New Faculty Benefits	0	0	\$43,827	\$90,283	\$92,991	
Total New Staff Benefits	0	0	0	0	0	
Total New Staff + Benefits	0	0	0	0	0	
Total Materials (M&O, Cap)	\$25,000	\$30,000	\$40,000	\$40,000	\$50,000	
New Faculty Recruitment	0	\$10,000	\$10,000	0	0	
New Faculty Start-Up	0	\$0	\$40,000	\$40,000		
Marketing	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	
Student Assistants	\$4,000	\$6,000	\$8,000	\$8,000	\$8,000	
Total Expenses	\$34,000	\$51,000	\$227,690	\$349,860	\$327,564	
Net Revenues	\$43,760	\$104,520	\$31,510	\$21,660	\$130,356	

Table II: Annual estimated enrollment and revenue projections for years 1-5 from program inception.

PROGRAM EVALUATION

The proposed Industrial Engineering program will be accredited by ABET, an international accreditation body specializing in engineering education. The USM Department of Engineering currently has two ABET accredited programs: electrical and computer engineering, and mechanical engineering, which have received high marks for continuous improvement and educational quality. ABET accreditation operates on a six year cycle, with new programs able to apply for evaluation as soon as there is a graduate in the program.

To meet ABET accreditation, the industrial engineering program will develop Program Evaluation Outcomes (PEOs) in coordination with engineering faculty, the engineering advisory board and current students. The program will be evaluated by ABET for meeting the PEOs as well as general ABET student outcomes criteria. The program will develop and maintain student outcome data annually via Student Program Assessment Data (SPAD) forms at the conclusion of each semester. SPAD form information will be aggregated and reviewed at the close of each academic year in a Student Outcome Review Process (SORP) to facilitate continuous improvement across the program. Regular meetings of the Engineering Advisory Board and Faculty use SORP data to review program educational objectives and ensure the program meets stakeholder (students and industry) needs.

In addition, the Department of Engineering will work with the engineering advisory board to collect postgraduation placement data in accordance with program goals 1 and 2. Data will be collected through alumni surveys and employer surveys aimed at tracking placement rates, job advancement statistics, diversity of industrial sectors and organizational leadership responsibilities. Data will be recorded and maintained within the Department of Engineering and reported to the engineering advisory board on an annual basis. The engineering advisory board will assess the data for program effectiveness in meeting program objectives.

OTHER RELEVENT INFORMATION

Advising will be conducted jointly by the University of Southern Maine's Advising Office and the Department of Engineering. Early enrollees in the Industrial Engineering program will be program advised by existing faculty within the Engineering Department. As new Industrial Engineering faculty hires join USM, students will be transferred to the requisite faculty.

SIGNATURES

Submitted by:

Acor Es

Scott J. Eaton, PhD Assistant Professor of Mechanical Engineering University of Southern Maine

Carlos Lück, PhD Chair, Engineering Department University of Southern Maine

Jeremy Qualls, PhD Dean, College of Science, Technology and Health University of Southern Maine

Sept. 6th, 2022

Date

7-September-2022

Date

Sept. 19th, 2022

Date

Approved by:

Adam Tuchinsky, PhD Interim Provost and Vice President for Academic Affairs University of Southern Maine

Jacqueline Edmondson, PhD President University of Southern Maine

10/05/22

Date

10/05/22

Date

5.1

APPENDIX A - LETTERS OF SUPPORT

5.1

College of Engineering Office of the Dean



5796 AMC Building, Room 210 Orono, Maine 04469-5796 Tel: 207.581.2217 Fax: 207.581.2220 engineering.umaine.edu

August 17, 2022

Dr. Carlos Lück Chair, Department of Engineering University of Southern Maine 149 John Mitchell Center 67 Campus Avenue Gorham, ME 04038

RE: Proposed USM Undergraduate Major BS in Industrial Engineering

Dear Dr. Lück:

I am pleased to offer my support for the proposed University of Southern Maine Undergraduate Major BS in Industrial Engineering. Looking at nationwide enrollment data, this is the largest engineering degree that is not currently offered in Maine. It would complement other engineering degrees currently offered by the University of Maine and University of Southern Maine. There are companies with significant operations in Maine that seek engineering graduates in this specialty.

The proposal to offer this degree is in accordance with the recommendations of the report *Growing Engineering to Grow Maine's Economy* prepared for the University of Maine System Board of Trustees by the UMaine-USM Engineering Planning Team with assistance from 45 North Research LLC, dated February 2018. I was a member of this planning team and advocated that USM develop and offer a BS in Industrial Engineering.

Thank you for this opportunity to write this letter of support. Please let me know if I can provide any additional information.

Sincerely,

Dana h. Amphing

Dana N. Humphrey, Ph.D., P.E. Dean of Engineering Saunders Professor of Engineering Leadership and Management

Cc: Provost John Volin

MAINE'S LAND GRANT, SEA GRANT AND SPACE GRANT UNIVERSITY



07/15/2022

Dr. Scott J. Eaton Department of Engineering Rm 222 John Mitchell Center University of Southern Maine, Gorham, ME 04038

Re: Letter of Support and Collaboration for B.S. in Industrial Engineering

Dear Dr. Eaton,

I am excited to participate in the development and delivery of the new degree program in Industrial Engineering at the University of Southern Maine. Industrial Engineering is an important engineering specialization with clear benefits to the State, the University and its graduates. Industrial Engineering has applications in almost all areas of business and industry, including those important to the greater Portland metroplex region such as manufacturing, healthcare and tourism. Future job prospects look very bright.

My specialization in operations research are foundational concepts in industrial engineering and are available to be leveraged in the degree program. As per our conversations, I am pleased to promote the inclusion of my courses in Operations Management (BUS 375) in the industrial engineering degree program. Further, I offer a course in Supply Chain Management (BUS 372) which would be a desirable technical elective to the students.

The timing of the new degree program proposal is ideal. Issues and concerns in operational resilience and supply chain management identified in the post pandemic economic emergence highlights the need for industrial engineers and systems thinking to strengthen our national infrastructure. The new degree program will support Maine's economic development and allow USM to participate in the post-pandemic national conversation.

Sincerely,

Amarpreet Kohli, PhD., Associate Professor of Operations and Supply Chain Management School of Business, University of Southern Maine, Portland, ME 04104 Tel: 207-780-4305, <u>amarpreet.kohli@maine.edu</u>



Department of Mathematics and Statistics

Dr. Scott J. Eaton Department of Engineering Rm 222 John Mitchell Center University of Southern Maine Gorham, ME 04038

Re: Letter of Support and Collaboration for B.S. in Industrial Engineering

Dear Dr. Eaton,

I am excited to participate in the development and delivery of the new degree program in Industrial Engineering at the University of Southern Maine. Industrial Engineering is an important engineering specialization with clear benefits to the State, the University and its graduates. Industrial Engineering has applications in almost all areas of business and industry, including those important to the greater Portland metroplex region such as manufacturing, healthcare and tourism. Future job prospects look very bright.

Industrial engineering overlaps with my specialization in operations research. Operations research concepts are foundational in industrial engineering and are available to be leveraged in the degree program. As per our conversations, I am pleased to promote the inclusion of my courses in deterministic modeling in operations research (MAT 366) and systems modeling and simulation (MAT 383) as required courses in the industrial engineering degree program. Further, I offer two additional courses in stochastic modeling in operations research (MAT 461) and queueing networks (STA 564) which would be desirable technical electives to the students.

The timing of the new degree program proposal is ideal considering the recent evolution of the Southern Maine economy. Issues and concerns in operational resilience and supply chain management identified in the post-pandemic economic emergence highlight the need for industrial engineers and systems thinking to strengthen our national infrastructure. The new degree program will support Maine's economic development and allow USM to participate in the post-pandemic national conversation.

Sincerely,

M. Ellalia

Muhammad El-Taha,

Professor

P.O. Box 9300, Portland, ME 04104-9300 PHONE (207) 780-4246, TTY (207) 780-5646, FAX (207) 780-5607 usm.maine.edu A member of the University of Maine System July 26, 2022

Dr. Scott J. Eaton Department of Engineering Rm 222 John Mitchell Center University of Southern Maine Gorham, ME 04038

Re: Letter of Support for B.S. in Industrial Engineering at USM

Dear Dr. Eaton,

Thank you for your efforts bringing together the proposed academic program in Industrial Engineering at the University of Southern Maine. Industrial engineering is an important, and currently lacking, skillset for Maine industries which can benefit broad sectors such as healthcare, transportation logistics, government and tourism. The envisioned program addresses the need for industrial engineers in the State and the timing of such a program is excellent given our economic emergence into a post-COVID world where supply chains and businesses are challenged as never before.

As president of the USM Engineering Advisory Board, I speak on behalf of all the members to congratulate you on your forward looking commitment to engineering education and supporting the needs of the State of Maine workforce. I have been witness to the planning and development of the new degree program in Industrial Engineering and strongly believe that the USM faculty, facilities and administration are well positioned to deliver an impactful degree program. The geographic location of the degree program, Portland/Gorham, is in the heart of Maine's industrial and economic engine and we expect significant collaborations to be forged between the department, your students and industry.

As the Engineering and Planning Department Training Manager, I know firsthand the critical need for engineers within the State of Maine. I see the immediate value of Industrial Engineering to our region. I am proud to offer this letter of support for the new academic program and I look forward to continuing our work with you to drive engineering education at USM to new heights.

Sincerely,

An Halle

Adam Henckler President – USM Engineering Advisory Board Engineering and Planning Department – Portsmouth Naval Shipyard

Academic & Student Affiars Committee - New Academic Program Proposal: B.S. Industrial Engineering, USM

SOUTHERN MAINE

Department of Engineering

August 25, 2022

Dr. Scott J. Eaton Department of Engineering Rm 222 John Mitchell Center University of Southern Maine Gorham, ME 04038

Re: Letter of Support for B.S. in Industrial Engineering at USM

Dear Dr. Eaton,

I am pleased to offer this letter of support to your work to realize a Bachelor of Science degree in Industrial Engineering in the state of Maine. As director of the Composites Engineering Research Laboratory (CERL), I oversee a lot of industrial based materials and engineering problem solving research. One of the biggest impediments to our work is the initial conversations with our clients where we have to go through multiple meetings with them to understand the problem, because a lot of the times they see the problems but do not have a good understanding of manufacturing or processing issues that can solve these problems. Thus, we end up spending a lot of time helping our clients discover what they don't know, and a lot of this will be solved by industrial engineers with a strong background in engineering problem solving. Having worked with you over the past few years, I believe that the USM team is well positioned to deliver a successful program that will have positive impacts for the State of Maine.

CERL is a non-profit laboratory that was started ten years ago to support industry and provide education in the field of composite science, advanced materials, and engineering, and has continued to flourish under that mission at USM. The services that CERL currently offer includes applied engineering expertise for manufacturing, process development and optimization, advanced materials analytical services (including non-destructive testing techniques), focused educational training, and prototyping. CERL also manufactures and sells its custom mobile infusion technology system (MITS) for vacuum infusion process (VIP) manufacturing for composite laminate panels. The industries served by CERL include marine composites, construction and structural composites, wind and hydrokinetics composites, transportation composites, polymer resin development, thermoplastic and thermoset resin manufacturers and processors, electronic packaging and semiconductors, and other consumer composites.

I look forward to working and collaborating with you in applications of industrial engineering within the materials in manufacturing realm of Industrial Engineering.

Sincerely,

Asheesh Lanba, Ph. D. Assistant Professor of Mechanical Engineering Director of Composites Engineering Research Laboratory (CERL) (207) 780-5582 asheesh.lanba@maine.edu



Department of Mechanical Engineering



5711 Boardman Hall, Room 219 Orono, Maine 04469-5711 Tel: 207.581.2120 Fax: 207.581.2379 umaine.edu/MechEng/

Date: July 26, 2022

Dear USM faculty senate and Board of Trustee:

I am pleased to write my letter of support for your newly developed industrial engineering program at USM. This letter also confirms my willingness to provide ongoing advice to the program. Industrial engineering is important to the State's economy and post-pandemic resilience. IE trains graduates in the design, analysis, and control of production and service operations and systems. The graduates will work in various sectors, including manufacturing, distribution, transportation, mercantile, and service. Their skill-sets will help local businesses and governments to have access to a unique talent pool which will help improve the efficiency of their systems. I have worked with the USM team in the development of the proposal and will be engaged going forward.

My name is Bashir Khoda, and I am an associate Professor in the Mechanical Engineering department and the Graduate Concentration Coordinator of Smart Manufacturing at the University of Maine, Orono campus. Additionally, I served as an affiliated faculty member in the Interdisciplinary Materials Science and Engineering program, Bio-medical Science and Engineering (BMSE) program, and Advanced Structures and Composites Center (ASCC). Prior to joining UMaine, I served as a tenure track assistant professor in the Industrial and Manufacturing Engineering department at the North Dakota State University. I received my Ph.D. in Industrial and Systems Engineering from the University at Buffalo (SUNY) in Buffalo, New York. I also earned my M.Sc. and B.Sc. degrees in Industrial and Production Engineering (IPE) from the Bangladesh University of Engineering and Technology (BUET), Bangladesh. I am a member of the Institute of Industrial Engineering (IIE); the American Society of Mechanical Engineers (ASME); Society for Manufacturing Engineers (SME). Based on my background, I feel comfortable and well suited to support the effort at USM for the industrial engineering program.

My best wishes to this new program and all involved with its development. If you have any questions, please do not hesitate to contact me.

Best Regards-

B.Krode

Bashir Khoda, Ph.D. Associate Professor Department of Mechanical Engineering, The University of Maine Room 208, 5711 Boardman Hall Orono, ME 04469-5711 Phone: 207-581-5183 (O); Fax: (207) 581-2379 https://faculty.umaine.edu/bashirkhoda/

MAINE'S LAND GRANT AND SEA GRANT UNIVERSITY

15 Casco Street Freeport ME 04033 | Ilbean.com

July 21, 2022

Scott J. Eaton, PhD Assistant Professor of Mechanical Engineering 222 John Mitchell Center Department of Engineering University of Southern Maine

Dear Scott,

I'm providing this letter of support for the proposed Industrial Engineering program at USM on behalf of L.L.Bean. The program goals of training graduates to solve complex problems within existing and emerging industries in Maine are relevant and important to many aspects of L.L.Bean's business.

The Industrial Engineering role in our Order Fulfillment Center (OFC) is a critical role. We leverage the skillset of Industrial Engineers to oversee warehousing processes. The engineering staff at the OFC is responsible for all standard operating procedures - working closely with building operators to ensure all processes are safe, ergonomically correct, and accurate. They establish all labor standards and are responsible for the material handling equipment from fork trucks to conveyor belts and sortation systems. In our Manufacturing facility, Industrial Engineers are also responsible for establishing manufacturing costs.

As automation and other new technologies emerge and expand, we anticipate ongoing need for Industrial Engineers who can design processes, solve complex challenges, and operate effectively in a collaborative and multidisciplinary context.

L.L.Bean has a robust internship program, hosting upwards of 50 interns each summer across all areas of the business. There are a variety of intern opportunities that would be suitable for Industrial Engineering students that would give them meaningful experience and build their skills in a corporate context. With other institutions we have created customized educational partnerships, such as co-ops and experiential learning projects. We would welcome the opportunity to partner with the Industrial Engineering program to provide opportunities for your students to gain direct experience and to address real business problems.

The Industrial Engineering program at USM would also create a much-needed talent pipeline for L.L.Bean. We have found it challenging to fill available Engineering positions. A recent job posting for an open IE position had no applicants from Maine and only one applicant from New England. An Industrial Engineering program located at USM would be of great benefit to us and building a partnership with this program would strengthen our ability to fill these critical roles.

Made for the shared joy of the outdoors

15 Casco Street Freeport ME 04033 | Ilbean.com

If I can provide additional information or answer any questions, please don't hesitate to contact me.

Sincerely,

Maureen Lafferty

Maureen Lafferty Vice President - Talent, Development and HR Business Teams L.L.Bean Inc <u>mlafferty@Ilbean.com</u>




Manufacturers Association of Maine

July 12, 2022

Dr. Scott J. Eaton Department of Engineering Rm 222 John Mitchell Center University of Southern Maine Gorham, ME 04038

Re: Letter of Support for B.S. in Industrial Engineering at USM

Dear Dr. Eaton,

I am pleased to be a partner with the University of Southern Maine engineering team and supporting your efforts to bring a Bachelor of Science degree in Industrial Engineering to Maine. Industrial engineers are a critical needed within Maine's manufacturing community. I believe that the USM team is well positioned to deliver a successful program given their strong track record in engineering education and geographic position within the Portland metroplex.

The Manufacturers Association of Maine (MAMe) is a 501(c) 6 and a 501 (c) 3 non-profit organization comprised of over 400 member companies in the State of Maine and surrounding Northern New England areas representing nearly 29,000 people in Maine's workforce. Industrial and systems engineers are one of the most requested engineering specializations within our community. A recent search for open positions in in the industrial and systems engineering in Maine yielded 94 advertisements. Employers in Maine routinely recruit these engineers from the Southern New England/New York south regions which has only become increasingly difficult given the post-pandemic environment.

We believe a new degree program in Industrial Engineering at the University of Southern Maine addresses an immediate short-term need with the State and positions the State and local businesses for long-term success. MAMe is looking forward to working and collaborating with the USM team in the areas of internship placements and business outreach.

Sincerely,

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Lisa G. Martin, Executive Director

33 Mcalister Farm Road Portland, ME 04103 207-747-4406 info@mainemfg.com www.mainemfg.com

"The Manufacturers Association of Maine is dedicated to promoting and growing manufacturing." We are Maine's Pro-Growth, Pro-Manufacturing organization

MaineHealth

August 26, 2022

Dr. Scott J. Eaton Department of Engineering Rm 222 John Mitchell Center University of Southern Maine Gorham, ME 04038

Re: Letter of Support for B.S. in Industrial Engineering at USM

Dear Dr. Eaton,

It is my pleasure to offer this letter of support to the University of Southern Maine engineering team for your efforts to bring a Bachelor of Science degree in Industrial Engineering to Maine. Industrial engineers are a critical need within the healthcare industry. As the head of MaineHealth's Innovation Center, I can attest to the value of industrial engineers to numerous aspects of the healthcare system. In particular, our vitally important efforts to optimize efficiency, eliminate waste, and improve productivity within clinical settings. I believe that the USM team is well positioned to deliver a successful program that has the potential to be a key partner for healthcare throughout the state.

MaineHealth is a not-for-profit integrated health system operating 17 service centers and more than 200 specialty and primary care practices across Maine and New Hampshire. We employ over 22,000 employees, with 1,700 service providers and physicians. We believe in working together to make our communities the healthiest in America.

We believe a new degree program in Industrial Engineering at the University of Southern Maine addresses an immediate short-term need in Maine and positions local businesses for long-term success. I am looking forward to working and collaborating with the USM team in applications of industrial engineering within the healthcare systems of Maine.

Sincerely,

Susan Ahern Vice President of Innovation MaineHealth

APPENDIX B - REVIEWED IE PROGRAMS LISTING

Undergraduate Programs in Industrial and/or Systems Engineering Reviewed

New Jersey Institute Technology, Mechanical and Industrial Engineering: https://mie.njit.edu/

Indiana Technical University, Industrial & Manufacturing Engineering: https://academics.indianatech.edu/programs/ime/

Morgan State University, Industrial & Systems Engineering: https://www.morgan.edu/soe/ise

Western Michigan University, Industrial & Manufacturing Engineering: https://www.morgan.edu/soe/ise

University of New Haven, Industrial & Systems Engineering: <u>https://www.newhaven.edu/engineering/undergraduate-programs/industrial-systems-engineering/</u>

Western New England University, Industrial Engineering: https://www1.wne.edu/academics/undergraduate/industrial-engineering.cfm

University of Minnesota, Industrial & Systems Engineering: https://cse.umn.edu/isye

Wright State University, Industrial & Systems Engineering: <u>https://www.wright.edu/degrees-and-programs/profile/industrial-systems-engineering</u>

Auburn University, Industrial & Systems Engineering: https://www.eng.auburn.edu/insy/

North Dakota State University, Industrial & Manufacturing Engineering: <u>https://www.ndsu.edu/ime/</u>

Georgia Technical University, Industrial Engineering: https://www.isye.gatech.edu/

California State Polytechnic University – San Luis Obisbo, Industrial Engineering: http://www.ime.calpoly.edu/

University of Ohio, Industrial and Systems Engineering: https://www.ohio.edu/engineering/ise

University of Massachusetts - Lowell, Industrial Engineering:

https://www.uml.edu/Engineering/Mechanical/Programs-of-Study/Undergraduate/industrialengineering-major.aspx

APPENDIX C – USM ENGINEERING CURRICULUM MAP



Unified Engineering Curricula 2023/2024 – draft 7/10/2022

Programs: EE-BS, COMP-EGN, ELEC-EGN, EE-MIN, MEE-BS, INDU-EGN, MEE-MIN, NGR-PR

ELE XXX: required EE courses **Department of Engineering** and their prerequisites + one ELE elective for a minor in EE







Course containing an integral laboratory component (+1: co-registration with a 1-credit lab course). Lab pre-regs are in the Catalog. Requires completion of 3 among Science Explorations, Socio-Cultural Analysis, Cultural Interpretation, and Creative Expression. Three Engineering Tools required: all majors require EGN 182, ECE majors require EGN 187, ME majors require EGN 188. IE Concentration majors require EGN 482 or EGN 484 to satisfy one of its technical electives.

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4 May be offered more than once/year, based on demand. 5 May be substituted by the HOV equivatient fram the Honors Program. 6 Requires advorce premission, with the expectation of graduation in 2 semesters. It May be satisfied in conjunction with another requirement (aka double-dipping)



APPENDIX D – APPROVAL LETTER FROM UMS FOR USM I.E. PROGRAM DEVELOPMENT



Vice Chancellor for Academic Affairs 15 Estabrooke Drive Orono, ME 04469

Tel: 207-973-3211 Fax: 207-581-9212 <u>www.maine.edu</u> Date: February 4, 2022

To: Dr. Glenn Cummings, President University of Southern Maine

Cc: Dr. Jeannine Diddle Uzzi, Provost

RAP

From: Robert Placido, VCAA The University of Maine System (UMS)

The University of Maine

University of Maine at Augusta

University of Maine at Farmington

University of Maine at Fort Kent

University of Maine at Machias

University of Maine at Presque isle

> University of Southern Maine

Subject: Intent to Plan - USM New Undergraduate Major BS in Industrial Engineering

The Chief Academic Officers Council (CAOC) reviewed the Intent to Plan submitted by the University of Southern Maine for a new BS in Industrial Engineering on January 20, 2022. The CAOC was supportive. The VCAA supports and approves this intent to plan.

Please do not hesitate to let me know if you have any questions.

APPENDIX E – CURRICULUM VITAE

Scott J. Eaton, Ph.D.

Assistant Professor of Mechanical Engineering

University of Southern Maine

John Mitchell Center	
Gorham, ME 04038	

(207)664-4847(c) scott.eaton@maine.edu

Professional Preparation

Magna Cum Laude w/Mathematics Minor

University of Maine – Orono	Chemical Engineering	Ph.D.	2015	
Dissertation Title: "Thermal Deoxygenation of Biomass Hydrolyzate Salts for the Production of Transportation Fuels"				
University of Tennessee - Knoxville	Mechanical Engineering	M.S.	2006	
Thesis Title: "Accelerated Poisoning of Diesel Oxidation Catalysts by Zinc				
Dialkyldithiophosphate Derived Phosphorus"				
University of Maine - Orono	Mechanical Engineering	B.S.	2004	

Appointments

2020 – present Asst. Professor of Mechanical Engineering, University of Southern Maine 2018 – 2020 Laboratory Director, ProVerde Laboratories, Portland, ME 2017 – present Chief Technology Officer, Foothill Fuels Inc., Portland, ME 2017 - 2018Asst. Research Prof. in Chemical Engineering, University of Maine - Orono Adjunct Professor of Chemical Engineering, University of Maine - Orono 2016 - 2017Assistant Research Professor of Engineering, Maine Maritime Academy 2015 - 20172009 - present Chief Technology Officer, SeaChange Group, LLC, Brunswick, ME 2010 - 2015Graduate Research Assistant, University of Maine - Orono 2009 - 2010Laboratory Engineer, Maine Maritime Academy 2006 - 2009Post-master's Research Associate, Oak Ridge National Laboratory 2006 - 2009Adjunct Research Assoc. University of Tennessee - Knoxville 2004 - 2006Graduate Research Assistant, University of Tennessee - Knoxville 2004 Engineering Intern, Naval Undersea Warfare Center, Newport, RI 2001 - 2004Engineering Assistant, University of Maine - Orono

Academic and Research – Honors and Awards

- Inducted: Francis Crowe Society 2015
- DOT University Transportation Center "Student of the Year" Award 2014
- Inducted: Pi Tau Sigma Mechanical Engineering Honor Society 2003
- Inducted: Sigma Pi Sigma Physics Honor Society 2002
- Inducted: Pi Mu Epsilon Mathematics Honor Society 2002
- University of Maine Presidential Achievement Award 2001

Service

- USM Industrial Engineering Program Planning Committee (2021-2022)
- USM Mathematics Preparation Work Group Member (2021)
- USM Hiring Event planning committee (2021)
- USM Cubesat Development Workshop Organizer (2020 present)
- USM Cubesat Design Competition (UCDC) Middle and High School mentor (12 teams) (2020 present)
- USM Cubesat Design Competition (UCDC 21) Organizer (2020 present)
- ASTM International Affiliate Member, D37 standards committee (2018 present)
- Consortium for Mathematics and Its Applications (COMAP) Interdisciplinary Contest in Modeling (ICM) Technical Paper Judge (2017 present)
- SEPA Data Literacy Teacher Mentor MDI Biological Laboratory (2018 2019)
- Scientific Content Reviewer Transportation Research Board (2017 present)
- Scientific Content Reviewer Elsevier Journals (2017 present)
- Marine Systems Engineering Co-op coordinator MMA (2017)
- Engineering Department Faculty Search Committee MMA (2017)
- Outcomes Assessment Committee MMA (2017)
- Engineering Department Planning Committee MMA (2016-2017)
- Environmental Sustainability Minor Development Team MMA (2015-2017)
- Thermal/Fluids Laboratory Coordinator MMA (2015–2017)
- Webmaster Marine Engine Testing and Emissions Laboratory (2015–2017)
- Assistant to the Director, Marine Engine Testing and Emissions Lab (2015–2017)
- Math/Physics Tutor (2015)
- Technical Advisor Clean Combustion Technologies, Rumford, ME (2010-2011)

Page **3** of **12**

• Scientific Content Reviewer – Society of Automotive Engineers (2008-2010)

Associations/Memberships/Professional Affiliations

- Technology Advisor Board eHempHouse, Binghamton, NY (2021-present)
- Vice Chair American Society of Mechanical Engineers, Northern New England Section (2021-present)
- External Associate Forest Bioproducts Research Institute, Orono, ME (2020–present)
- Affiliate Marine Engine Testing and Emissions Laboratory, Castine, ME (2018–present)
- ➢ ASTM International Affiliate Member (2018 − present)
- ➤ TRB Standing Committee on Marine Environment AW030, Member (2017 2020)
- Technical Advisory Board SeaChange Group LLC, Brunswick, ME (2017 present)
- ➤ Transportation Research Board, Affiliate (2016 2020)
- American Institute of Chemical Engineers, Member (2013 present)
- American Chemical Society, Member (2013 present)
- Society of Automotive Engineers, Member (2006 present)
- American Society of Mechanical Engineers (2004 present)

Workshops Attended

- Summer Antiracism Institute, University of Southern Maine, June 2021.
- American Society of Mechanical Engineers Group Leadership Development Conference (ASME GLDC), virtual, May 2021
- Grants Academy, University of Maine System, October 2020 May 2021
- CTEL Brightspace Training, University of Southern Maine, July 2020

Research Funding History

Engineering Research Grants

- University of Maine Reinvestment Fund (\$15,000)
 Track 1: Advanced hybrid nanocatalysts for carbon dioxide hydrogenation to ethylene.
 Senior Personnel 2021-2022
- American Society of Brewing Chemists (\$7,000) Development of a chemiluminescent detection apparatus for dimethyl sulfide in beer process streams. Senior Personnel 2020-2021
- Maine Space Grant Consortium (\$15,637)
 Cubesat Development and K-12 Outreach at USM. PI 2020-2024
- University of Maine Reinvestment Fund (\$100,000)

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Microalgae Culture Coupled Catalysis: Producing Marine Diesel Fuel Additives from Algal Biomass. <u>co-PI</u> 2017.

- Northeast Regional Sun Grant, DOE Sungrant Initiative (\$150,000) Biobased Lubricants and Fuels: Integration of Chemical Catalysis with Mixed Culture Fermentation. <u>co-PI</u> 2017.
- Defense Logistics Agency (\$2.3 Million) Woody Biomass Conversion to Liquid Hydrocarbon Fuels Subaward PI (\$115,337) Contract #SP4701-16-C-0037, 2016.

✤ National Science Foundation MRI (\$381,585)

MRI: Acquisition of a Gas Chromatography Triple Quadrupole Mass Spectrometer for Research and Teaching at Maine Maritime Academy. <u>Principal Investigator</u> Award #OIA-1625712, 2016.

- Department of Transportation University Transportation Centers (\$3.2 Million) Marine Engine Testing and Emissions Laboratory. Investigator Tier I Award #DTRT13-G-UTC43, 2015. I served as Assistant Director to help manage center staff and maintain external collaborations as well as lead fuel and emissions research programs.
- Department of Energy STTR (\$150,000)
 A Thermal Deoxygenation Process for Cellulosic Biomass Conversion to Energy-Dense Biofuels. <u>co-PI</u> Award #DE-SC0008250, 2012.
- Maine Technology Institute (\$17,465)
 High-Speed Diesel Engine Test Platform. Principal Investigator Award #SG5094, 2012.
- Maine Technology Institute (\$24,654)
 Prototype Eco-Hybrid Fuel Processor. Principal Investigator Award #SG5095, 2012.
- National Science Foundation SBIR (\$150,000) Development of Glycerin/Biodiesel Blended Marine Fuels. <u>Principal Investigator</u> Award #IIP-1046784, 2011.
- National Science Foundation SBIR (\$30,000) Development of Glycerin/Biodiesel Blended Marine Fuels. <u>Principal Investigator</u> Award #IIP-1046784 ext., 2011.
- Maine Technology Institute (\$4,985) Development of Glycerin Emulsions for Diesel Marine Fuels Principal Investigator Award #PZ143, 2011.
- Maine Technology Institute (\$10,000) Development of Bio Product Blended Marine Fuels. <u>Principal Investigator</u> Award #PP014, 2011.

Technology Development Grants

- Maine Technology Institute (\$8,710) Renewable Camping Fuel Phase II. <u>Principal Investigator</u> Award #SG5614, 2017.
- Maine Technology Institute (\$24,481)

Scott J. Eaton, PhD

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Development of Enzymatic Biodiesel Manufacturing Technologies for Sustainable Heat and Power Generation. <u>Principal Investigator</u> Award #SG5573, 2016.

- Maine Technology Institute (\$23,969) Renewable Camping Fuel Phase I. Principal Investigator Award #SG5531, 2016.
- Maine Technology Institute Development Loan (\$250,000) EHF Refinement & Early Adopter Testing. Principal Investigator Award #DL4004, 2014.
- Maine Technology Institute Development Loan (\$244,881) Product Validation Testing of Low Emission Fuels. <u>Principal Investigator</u> Award #DL3304, 2013.
- New England Clean Energy Council (\$30,000) Development and Marketing of Green Marine Fuel. <u>Principal Investigator</u> CINE Award, 2013.
- Maine Technology Institute (\$4,975) Intellectual Property Filing for Low-Emissions Fuel Mixtures. Principal Investigator Award #TS0085, 2012.
- Maine Technology Institute (\$7,510) Market Research for Green Marine Fuels. Investigator Award #SG4659, 2011.

Inventions

- A. Dusseault and S.J. Eaton, University of Southern Maine, <u>Variable Volume Pressurized</u> <u>Fuel Container</u>. Application Submitted **2021**.
- S.J. Eaton and G.N. Harakas, SeaChange Group LLC, <u>Glycerol Containing Fuel Mixture</u> for Direct Injection Engines. Canadian Patent # CA2837269A1, May 22nd, **2018**.
- G.N. Harakas, S.J. Eaton, R.W. Kimball, B.G. Braley and R.C. Ring, SeaChange Group LLC, <u>Biodiesel Glycerol Emulsion Fuel Mixtures</u>. U.S. Patent #9,976,096 B2 May 22nd, 2018
- 4) S.J. Eaton and G.N. Harakas, SeaChange Group LLC, <u>Glycerol Containing Fuel Mixture</u> for Direct Injection Engines. European Patent Office #EP2714860A2, Dec. 7th, **2016**.
- 5) S.J. Eaton and G.N. Harakas, SeaChange Group LLC, <u>Glycerol Containing Fuel Mixture</u> for Direct Injection Engines. U.S. Patent #9,410,102 B2, Aug. 9th, **2016**.
- G.N. Harakas, S.J. Eaton, R.W. Kimball, B.G. Braley and R.C. Ring, SeaChange Group LLC, <u>Biodiesel Glycerol Emulsion Fuel Mixtures</u>. U.S. Patent #9,303,228 April 5th, 2016

Scott J. Eaton, PhD

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 S.J. Eaton and G.N. Harakas, SeaChange Group LLC, <u>Glycerol Containing Fuel Mixture</u> for Direct Injection Engines. U.S. Patent #8,679,202 B2, Mar. 25th, **2014**

Teaching Experience

University of Southern Maine

<u>EGN 301 Junior Design Project and the Engineering Profession:</u> A first course in the engineering design process. Project management basics and the importance of team work. Junior level engineers develop tem-based design to real engineering applications.

<u>EGN 498 Introduction to Combustion Science:</u> This introductory course introduces basic concepts of thermochemistry, mass diffusion and chemical kinetics to explain combustion and flame phenomena. Applications include burners and internal combustion engines.

EGN 498 Spacecraft System Engineering: An introduction to mission planning and space engineering. This course develops the role of the systems engineer in the planning and successful execution of space missions. Topics include orbital mechanics, positioning, attitude control, thermal engineering, power management and critical failure analysis. Impacts of space engineering on society are discussed.

<u>MEE 331 Thermodynamics II: Flows and Cycles</u>: Junior/Senior level course for mechanical engineering students utilizing the 1st and 2nd Laws of thermodynamics to analysis conceptual and real thermodynamic systems for heat, work and efficiency.

<u>MEE 339 Thermodynamics Laboratory:</u> A compendium laboratory course to MEE 331 providing students a hands-on affirmation of thermodynamics concepts as they apply to power generation, refrigeration systems and alternative energy cycles.

<u>MEE 432 Heat Transfer</u>: A systematic treatment of heat transfer conduction, convection and radiation. Fundamental laws are presented and governing heat equations are developed to develop analytical solutions to solve common engineering problems.

<u>MEE 439 Fluid Mechanics & Heat Transfer Laboratory:</u> Exploration of theory and applications of fluid mechanics and heat transfer in the laboratory.

Maine Maritime Academy

<u>Et-351 Thermal/Fluids Lab</u>: Senior level engineering technology lab covering uncertainty of measurements analysis, gas turbines cycle analysis, heat pumps, impulse turbines, alternative engineering, solar collectors and water heaters and fuel cells

<u>ES-510 Engineering Test Lab</u>: 4th and 5th year undergraduate systems engineering laboratory course covering topics in thermodynamics, gas and internal combustion cycle analysis, materials, electronics, vibrations, and uncertainty of measurements analysis

<u>Et-362L Material Properties Lab</u>: Senior level laboratory course for engineering technology students that is an addendum to lecture course and covers the common test procedures including 3-pt bend tests, tensile tests Charpy tests, hardness tests, heat treatments and materials properties

<u>Et-371L Electrical Power I Lab</u>: Introductory laboratory course to marine systems and technology students covering basic electronic circuit construction, testing equipment, AC and DC motor operation and control techniques

<u>Et-201L Fluid Power Lab</u>: Introductory laboratory course for marine systems and technology students and covers the applications of basic fluid mechanics including hydraulics, Bernoulli equation, moody charts, piping systems and pumps

University of Maine

<u>CHE-461: Combustion and Fuel Processing</u>: Co-lead 4th year undergraduate or 1st year graduate student course covering the fundamental aspects of solid, liquid and gaseous fuel chemistry and combustion. Fuel processing technologies and unit operations are introduced and combustion systems analysis is used to set system design criteria for optimal performance.

Publications

Peer Reviewed - Submitted or Published

- S.J. Eaton, A. Lanba. J. Qualls, D. Fransiscus, T. Werner, H. Kguyen and C. Bailey. "CubeSat Design Competition to Foster K-12 STEM Participation in Maine". *Proceedings of the ASEE 2022 Annual Conference* 2022 Paper #36862
- S.J. Eaton, S.A. Karunarathne, M. Kline, S. Payne, H.P. Pendse and M.C. Wheeler. "Combustion Dynamics of Crude and Upgraded Thermal Deoxygenation Oils in a Compression Ignition Engine". *Fuel.* 2022 324(B), 124700.
- 3. **S.J. Eaton** and M.C. Wheeler. "Intensification of Biomass Thermal Deoxygenation via a Two-Stage Process". *Ind. & Chem. Eng. Res.* **2021** 60(3), 1194-1199.
- 4. J. Wakshlag, **S.J. Eaton**, R. Prussin and C. Hudalla. "Cannabinoid, terpene, and heavy metal analysis of 29 over the counter commercial veterinary hemp supplements". *J. Veterinary Medicine: Research and Reports* **2020** 15(11), 45-55.
- 5. **S.J. Eaton**, T.T. Wallace, B.G. Sarnacki, T. Lokocz-Adams, R.W. Kimball, J.A. Henry and G.N. Harakas. "Combustion and Emissions of Glycerol Emulsion Fuel in a Medium-Speed Diesel Engine". *J. Marine Eng. Tech.* **2018** 18(2), 102-111.
- 6. **S.J. Eaton** and M.C. Wheeler. "Reactions and Kinetics of Alkaline-Earth Metal Levulinate and Formate Salt Decomposition". *Sustain. Chem. Eng.* **2017** 5(4), 3039-3045

- R.W. Kimball, B.G. Sarnacki, S.J. Eaton, J.A. Henry, T. Wallace and T. Lokocz. "Diesel Engine Emissions/Performance of Emulsion Marine Fuels". *Proceedings of the 17th Annual General Assembly of the International Association of Maritime Universities* (IAMU AGA 17) 2016.
- 8. **S.J. Eaton**, S.H. Beis, S.A. Karunarathne, H.P. Pendse, M.C. Wheeler. "Hydrotreatment of Thermal Deoxygenation Oils Derived from Bio-Renewable Feedstock". *Energy & Fuels* **2015**, 29(5), 3224-3232.
- S.J. Eaton, G.N. Harakas, R.W. Kimball, J.A. Smith, K.A. Pilot, M.T. Kuflik and J.M. Bullard. "Formulation and Combustion of Glycerol-Diesel Fuel Emulsions". *Energy & Fuels* 2014, 28(6), 3940-3947.
- S.J. Eaton, S.H. Beis, B.G. Bunting, S.W. Fitzpatrick, G.P. van Walsum, H. Pendse, M.C. Wheeler. "Characterization and Combustion of Crude Thermal Deoxygenation Oils Derived from Hydrolyzed Woody Biomass". *Energy & Fuels* 2013, 27(9), 5246-5252
- S.J. Eaton, B.G. Bunting, S.A. Lewis & C. Fairbridge. "Effect of Narrow Cut Oil Shale Derived Distillates on HCCI Engine Performance." SAE Paper# 2009-01-2646
- 12. B.G. Bunting, **S.J. Eaton** & R. Crawford. "Performance Evaluation and Optimization of Diesel Fuel properties and Chemistry in an HCCI Engine." *SAE Paper*# 2009-01-2645
- S.J. Eaton, B.G. Bunting, T.J. Toops & K. Nguyen. "Effect of Soot Accumulation on Light-off Performance of Field-Aged and Accelerated Phosphorus Poisoning Diesel Oxidation Catalysts." *Proceedings of the 20th North American Catalysis Society Meeting* (NAM), Houston, TX 2009
- 14. **S.J. Eaton**, K. Nguyen, T.J. Toops & B.G. Bunting. "The Roles of Phosphorus and Soot on the Deactivation of Diesel Oxidation Catalysts." *SAE Paper*# **2009**-01-0628
- 15. J.A. Massey, J.A. Drallmeier, S.J. Eaton and R.M. Wagner. "Influence of the Combustion Energy Release on Surface Accelerations of an HCCI Engine". SAE Paper# 2009-01-2741
- B.G. Bunting, S.J. Eaton, R. Crawford, L. Wolf, S. Kumar, D. Stanton & H. Fang. "Performance of Biodiesel Blends of Different FAME Distributions in HCCI Combustion." SAE Paper# 2009-01-1342
- J. Massey, J. Drallmeier, S.J. Eaton & R. Wagner: "Contribution of Combustion Energy Release to Surface Accelerations of an HCCI Engine." Proceedings of 6th U. S. National Combustion Meeting, Ann Arbor, MI 2009
- B.G. Bunting, S.J. Eaton, K. Puduppakkam, C. Naik, C.P. Chou & E. Meeks. "A Comparison of HCCI Ignition Characteristics of Gasoline Fuels Using a Single-Zone Kinetic Model with a Five Component Surrogate Fuel." SAE Paper# 2008-01-2399
- B.G. Bunting, S.J. Eaton, J. Storey, C. Fairbridge, K. Mitchell, R.W. Crawford, T. Gallant, J. Franz & M. Alnaijar. "The Chemistry, Properties and HCCI Combustion Behavior of Refinery Streams Derived from Canadian Oil Sands Crude." SAE Paper# 2008-01-2406
- S.J. Eaton, K. Nguyen, B.G. Bunting & T.J. Toops. "Deactivation of Diesel Oxidation Catalysts by Oil-Derived Phosphorus." SAE Paper# 2006-01-3422

21. B.G. Bunting, J.P. Szybist, T.J. Toops, K. Nguyen, S.J. Eaton, A. Youngquist & A. Gopinath. "The Use of Small Engines as Surrogates for Research in Aftertreatment, Combustion and Fuels." SAE paper# 2006-32-0035

Publications in Progress

- S.J. Eaton, B.G. Sarnacki, J.A. Henry, T.T. Wallace, T. Lokocz Adams, R.W. Kimball. "Exhaust Chemistry and Particulate Morphology of Glycerol-Diesel Emulsions in a High-Speed Indirect Injection Engine" *Fuel* **2022** In Progress
- B.G. Sarnacki, J.A. Henry, S.J. Eaton. "TEM Image Thickness Contrast for Determination of Soot Particle Characteristics" *Combustion and Flame* **2022** In Progress.

Other Publications

- Feature Article: Transportation Research News. "Marine Transportation and the Environment: Trends and Issues" January February 2018
- Fuel Technologies Annual Progress Report: "Non-Petroleum Fuel Effects in Advanced Combustion Regimes". DOE/EE-0724 2009

Invited Talks

- Cubesats for Education" Create and Learn (Online) April, 2022
- *"Marine Engine Testing and Emissions Laboratory"* Oak Ridge National Laboratory Fuels, Engines and Emissions Research Center. Oak Ridge, TN August, 2015.

Panel Discussions and Workshops

- "Springs!" Girl Scouts of Maine, Portland, ME March 2022
- "Ask an Engineer" Portland High School, Portland, ME October 2021.

Conference Presentations

- 1. <u>S. Karunarathne</u>, M. Kline, **S.J. Eaton**, H.P. Pendse and M.C. Wheeler. "Synthesis of Renewable Jet Fuel Range Cycloparaffins with Levulinic and Formic Acids" American Institute of Chemical Engineers (AIChE) Annual Meeting, Boston **2021**.
- <u>L. Benedict</u> and S.J. Eaton. "Development of a Simple and Portable Chemiluminescence Device for the Quantitation of DMS in Beer and Wart" American Society of Brewing Chemists (ASBC) Annual Meeting (virtual), 2021.
- 3. <u>S.J. Eaton</u>, S. Karunarathne, S. Payne, H.P. Pendse and M.C. Wheeler. "Heat Release Analysis of Neat and Upgraded Biorenewable Thermal Deoxygenation Oils in a Diesel

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Engine" American Institute of Chemical Engineers (AIChE) Spring Meeting (virtual), **2021**.

- 4. <u>S. Karunarathne</u>, M. Klein, **S.J. Eaton**, H.P. Pendse, M.C. Wheeler. "Production of Biorenewable Thermal Deoxygenation Oil and Upgrading to Diesel and Jet Fuel Range Hydrocarbons" American Institute of Chemical Engineers (AIChE) Annual Meeting, San Francisco (virtual), **2020**
- <u>R.W. Kimball</u>, B.G. Sarnacki, S.J. Eaton, J.A. Henry, T. Wallace and T. Lokocz. "Diesel Engine Emissions/Performance of Emulsion Marine Fuels". Proceedings of the 17th Annual General Assembly of the International Association of Maritime Universities (IAMU AGA 17) Hanoi, Vietnam 2016.
- M.C. Wheeler, S.J. Eaton and W.J. Desisto. "Transportation Fuels Via a Two-Stage Thermal Deoxygenation Process" 252nd ACS National Meeting & Exposition, Philadelphia, PA 2016.
- <u>S.J. Eaton.</u> "Alternative Fuels: Opportunities for Meeting Low Sulfur Targets". 4th Biennial TRB-CMTS Research and Development Conference, Washington, D.C. 2016
- 8. <u>S.J. Eaton</u>, G.N. Harakas and R.W. Kimball. "Characterization of Glycerol-Diesel Emulsion Fuels". American Institute of Chemical Engineers (AIChE) annual meeting, Atlanta, GA **2014**.
- 9. <u>S.J. Eaton</u>, M.C. Wheeler and H.P. Pendse. "Levulinate and Formate Salt Reactions During Thermal Deoxygenation (TDO)". American Institute of Chemical Engineers (AIChE) annual meeting, Atlanta, GA **2014**.
- <u>S.J. Eaton</u>, G.N. Harakas and R.W. Kimball. "Formulation and Combustion of Glycerol Emulsion Diesel Fuels". American Society of Mechanical Engineers (ASME) 8th International Conference on Energy Sustainability (ESFuelCell2014), Boston, MA 2014.
- S.J. Eaton, M.C. Wheeler, S.H. Beis, S.A. Karunarathne. "Thermal Deoygenation (TDO): Effect of Cation on Production and Characteristics of Straight-Run Fuels". American Institute of Chemical Engineers (AIChE) annual meeting, San Francisco, CA 2013.
- S.J. Eaton, B.G. Bunting, M.C. Wheeler and G.P. van Walsum. "Engine Performance of Bio-Hydrocarbons Produced by Thermal Deoxygenation of Biomass Derived Organic Acids". American Institute of Chemical Engineers (AIChE) Annual Meeting, Pittsburg, PA 2012.
- G.N. Harakas, <u>S.J. Eaton</u>, R.W. Kimball, M.T. Kuflik, K.A. Pilot and J.M. Bullard. "Development and Evaluation of Glycerol-Diesel (Eco-Hybrid) Fuels with a Lower Environmental Impact for the Marine Industry". 244th National Meeting of the American Chemical Society (ACS), Philadelphia, PA **2012**.
- 14. B. G. Bunting, <u>S. J. Eaton</u>, J. Taylor, K. Nguyen, K. Puduppakkam & E. Meeks: "A Comparison of HCCI Engine Performance Data and Kinetic Modeling Results Over a Wide Range of Gasoline Range Surrogate Fuel Blends." Directions in Engine-Efficiency and Emissions Research (DEER), Dearborn, MI 2009.

- B. G. Bunting, <u>S. J. Eaton</u>, J. Storey, S. A. Lewis, T. Barone & M. Connatser: "Detailed HCCI Exhaust Speciation – ORNL Reference Fuel Blends." Directions in Engine-Efficiency and Emissions Research (DEER), Dearborn, MI 2009.
- <u>B. G. Bunting</u>, T. J. Toops, K. Nguyen, S. J. Eaton, H. Kim & A. Youngquist: "Status Report: The Development of Rapid Aging and Protocols for Diesel Aftertreatment Devices." Directions in Engine-Efficiency and Emissions Research (DEER), Detroit, MI 2006.
- <u>B.G. Bunting</u>, S.A. Lewis, K. More, K. Nguyen and S.J. Eaton." Phosphorus Poisoning and Phosphorus Exhaust Chemistry with Diesel Oxidation Catalysts". 8th DOE Crosscut Workshop on Lean Emissions Reduction Simulation (CLEERS), Dearborn, MI 2005.

Conference Posters

- <u>M.C. Wheeler</u>, S.J. Eaton and W.J. Desisto. "Transportation Fuels Via a Two-Stage Thermal Deoxygenation Process" 252nd ACS National Meeting & Exposition, Philadelphia, PA 2016.
- <u>S.J. Eaton</u>, M.C. Wheeler and H.P. Pendse. "Decomposition Pathways During Pyrolysis of Hydrolyzate Salts". Symposium on Thermal and Catalytic Sciences for Biofuels and Biobased Products (TCS2014), Denver, CO 2014.
- <u>S.J. Eaton</u>, M.C. Wheeler and H.P. Pendse. "Chemistry and Kinetic Modeling of Thermal Deoxygenation Reactions". American Institute of Chemical Engineers (AIChE) Annual Conference, San Francisco, CA 2013.
- 4. <u>S.J. Eaton</u>, S.H. Beis, G.P. van Walsum, H.P. Pendse and M.C. Wheeler. "Thermal Deoxygenation of Woody Biomass Hydrolyzate". The Third International Conference on Thermochemical Conversion of Biomass (TCBiomass2013), Chicago, IL **2013**.
- 5. S.J. Eaton, G.N. Harakas and <u>R.W. Kimball</u>. "Eco-Hybride Diesel/Glycerin Based Emulsion Fuel: A Low Emissions, Low Cost, Drop-in Diesel Fuel". Directions in Engine-Efficiency and Emissions Research (DEER), Detroit, MI **2012**.
- S. J. Eaton, <u>R. Kimball</u>, C. Pelletier, C. Tolman & P. Betti: "SNAME at Maine Maritime Academy, Development of alternative heavy marine fuels." Society of Naval Architects and Marine Engineers Symposia <u>Operating Ships Within Emission Control Areas</u> (ECA's), San Francisco, CA 2010.
- <u>T.L. Barone</u>, J.M.E. Storey, S.J. Eaton and B. Bunting: "The influence of fuel chemical composition on Particulate Emissions from an Advanced Combustion Engine." American Association of Aerosol Research Annual Conference, Minneapolis, MN 2009.
- S. J. Eaton, B. G. Bunting, T. J. Toops & K. Nguyen: "Impact of Lube-Oil Phosphorus on Diesel Oxidation Catalysists." Directions in Engine-Efficiency and Emissions Research (DEER), Detroit, MI 2007.

Scott J. Eaton, PhD

- S. A. Lewis, B. G. Bunting & S. J. Eaton: "Determining the Combustion Product of Zinc Dialkyldithiophosphate Using Electrospray Mass Spectrometry." Directions in Engine-Efficiency and Emissions Research (DEER), Chicago, IL 2005.
- <u>B. G. Bunting</u>, S. A. Lewis, T. J. Toops, K. Moore, K. Nguyen, A. Gopinath, S. J. Eaton & H. Kim: "Development of Rapid Aging and Poisoning Methods for the Verification of Combustion Engine Aftertreatment Devices." Directions in Engine-Efficiency and Emissions Research (DEER), Chicago 2005.

ASHEESH LANBA

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EDUCATION

Ph.D. - Pennsylvania State University, University Park, PA, USA

Engineering Science and Mechanics

• Dissertation: NiTi-based Shape Memory Alloys: Relating Physical Deformation Mechanisms and the Wide Hysteresis; Advisor: Dr. Reginald F. Hamilton

B. Eng - Nanyang Technological University, Singapore

Mechanical Engineering

• Specialization: Aeronautical Engineering

EXPERIENCE

Assistant Professor of Mechanical Engineering, University of Southern Maine, Portland, ME, USA 2019-Present

- Teach materials science and mechanics-based courses and laboratories. Specific courses include EGN260 -• Materials Science for Engineering, MEE259 – Statics and Strength of Materials Laboratory, MEE356 – Introduction to the Finite Element Method, MEE270 – Applied Mechanics: Dynamics, EGN498 – Advanced Topics in Materials Science.
- Director of the Composite Engineering Research Laboratory (CERL), where I am principal investigator in charge of approximately \$1.2 million worth of equipment, overseeing industry-based research projects
- Founded the first student chapter of the Society for the Advancement of Material and Process Engineering (SAMPE), and the current faculty advisor.
- Principal investigator (PI) of the laser and materials engineering (LAME) research laboratory, where we conduct research on advanced materials (composites, biopolymers, shape memory alloys (SMAs)) characterization and applications, laser ablation tomography (LATscan), and automating image segmentation/classification via machine learning.
- Consult with industry on product development and commercialization
- Serve on the Maine Technology Institute (MTI) Composites Material Technology Board, providing reviewer input on investment applications and acting as an ambassador to targeted industry sectors
- Designed and deployed over 250 3D printed face-shields to healthcare and essential workers during the • COVID-19 pandemic.

Chief Operations Officer, Lasers for Innovative Solutions, State College, PA, USA 2015-2019

- Supervise and undertake Laser Ablation Tomography (LATscan) projects to deliver data to researchers all over the world. The novel technology is used for 3D structural and anatomical analyses (www.LATscan.com)
- Developed LATscan to image composite, metallic and dense biological material like corals and bones
- Designed and machined components for open beam paths, scanner, stages and machine vision
- Oversee all scientific collaborations with researchers all over the world to develop innovations in laserbased processes
- Enabled systems integration between laser, scanner, stages and machine vision for high-throughput LATscan and micro-machining projects
- Characterize machined materials via SEM, optical microscopy to analyze cut quality, heat-affected zones ٠ and dimensions
- Established image processing pipelines for segmentation and quantification to identify anatomical and morphological features for high-throughput LATscan projects
- Developing LATChem, an extension of the existing technology that will utilize 3D spectroscopy to identify the chemistry of features being visualized via LATScan

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2005 - 2009

2009 - 2015

Graduate Research/Teaching Assistant, Pennsylvania State University, University Park, PA, USA 2009 -2015

Thermo-mechanical Characterization of Martensitic Transformation in NiTi Shape Memory Alloys

- Applied an innovative energetic analysis methodology to quantify elastic strain and irreversible energy contributions from calorimetric analysis
- Demonstrated for the first time the thermal rate dependence of the energetics associated with the differential phase transformations in NiTi
- Designed, built and optimized a heating/cooling system on a uniaxial load frame that allowed temperature variation between -120 and 400 °C
- Optimized full-field strain analysis via Digital Image Correlation to analyze in-situ micro-scale deformations
- Exposed for the first time the evolution of full-field micro-scale strains of the stress-biased thermallyinduced transformation and reversal of reoriented martensite in NiTi alloys
- Established the influence of applied loading mode on superelastic stabilization

Developing Structure-Property-Function Relationships for Wide Hysteresis Composite NiTiNb alloys

- Discovered consequences of strain energy relaxation that lead to widening of thermal hysteresis and reverse transformation temperature interval
- Conducted original comparative study contrasting the microstructure, martensitic transformation and failure of cast versus deformation-processed alloys
- Discovered and characterized unconventional shape memory effect behavior in a temperature regime where superelastic recovery is expected
- Introduced a new opportunity for pre-straining at high temperatures for heat-to-recover applications, specifically to strengthen concrete bridge girders

Teaching and Mentoring

- Taught 'Statics', 'Strength of Materials' and 'Dynamics' to two classes of around 70 students
- Conducted undergraduate laboratory sessions for 'Experimental Stress Analysis', and delivered lectures to a class size of 35 students as a substitute professor
- Held responsibility for grading quizzes and exams, and maintained class gradebooks
- Trained and mentored undergraduate students on materials characterization under NSF Research Experience for Undergraduates.

Undergraduate Research, Nanyang Technological University, Singapore

- Investigated theoretical and analytical means (involving ANSYS) for stress intensity factor computation in fracture mechanics
- Developed a new crack tip element that is tolerant to severe mesh distortion, for stress intensity factor computation using the Finite Element Method (involving MATLAB)
- Developed and structured a project to prevent chipboard factory fires caused by spontaneous ignition of sawdust using the 'Bifurcation Technique' by creating a new mathematical model

Industrial Attachment Internship, ExxonMobil Asia Pacific Private Limited, Singapore

- Nominated for the industrial attachment book prize for top 7 internships of the year
- Worked as Reliability Engineering Trainee with the Singapore Intermediates and Aromatics refinery
- Created and maintained a technical resources management system that resulted in reduction of reliability and maintenance costs by 14% over the previous year
- Designed and implemented a solution to prevent the hazardous effect of a nitrogen leak in the office ventilating system

- - -

2008-2009

Publications

- Lanba, A., Hall, B. and Huff, W., 2022. *Laser Ablation Tomography for Rapid Three-Dimensional Tissue Imaging and Analysis*. Journal of Engineering and Science in Medical Diagnostics and Therapy, 5(4), p.041006.
- Morrison III, W.R., Lanba, A., Hall, B. and Bruce, A., 2020. *Novel implementation of laser ablation tomography as an alternative technique to assess grain quality and internal insect development in stored products*. Journal of Stored Products Research, 86, p.101552.
- Hall, B. & Lanba, A., 2019. *Three-dimensional analysis of biological systems via a novel laser ablation technique*. Journal of Laser Applications, 31(2), p.022602.
- Dilibal, S., Hamilton, R.F. & Lanba, A. (2017). The effect of employed loading mode on the mechanical cyclic stabilization of NiTi shape memory alloys. Intermetallics, 89, 1-9
- Lanba, A., & Hamilton, R. F. (2015). *The Impact of Martensite Deformation on Shape Memory Effect Recovery Strain Evolution*. Metallurgical and Materials Transactions A, 46A, 3481-3489
- Hamilton, R. F., Lanba, A., Ozbulut, O., & Tittmann, B. (2015). Shape Memory Effect in Cast versus Deformation-Processed NiTiNb Alloys. Shape Memory and Superelasticity, 1, 117-123
- Ozbulut, O.E., Hamilton, R.F., Sherif, M.M. and Lanba, A., (2015). *Feasibility of self-pre-stressing concrete members using shape memory alloys*. Journal of Intelligent Material Systems and Structures, 26(18), 2500-2514.
- Lanba, A., & Hamilton, R. F. (2014). *Elastic and Irreversible Energies of a Two-Stage Martensitic Transformation in NiTi Utilizing Calorimetric Measurements*. Metallurgical and Materials Transactions A, 45A, 2732–2740

Conference Proceedings

- Lanba, A. & Hall, B. (2019). Laser Ablation Tomography for 3D Tissue Imaging and Analysis, ASME International Mechanical Engineering Congress and Exposition (IMECE)
- Michaels, S. C., Moses, K. C., Bachmann, R. J., Hamilton, R. F., Pena-Francesch, A., Lanba, A., Demirel, M.C. & Quinn, R. D. (2015). *Biomimicry of the Manduca sexta Forewing using SRT Protein Complex for FWMAV Development*. Living Machines, 4th International Conference on Biomimetics and Biohybrid Systems
- Hamilton, R. F., Lanba, A., & Ozbulut, O. (2015). *Characterization of Martensitic Transformation Morphology in Wide Hysteresis Shape Memory Alloys*. In J. Carroll & S. Daly (Eds.), Fracture, Fatigue, Failure, and Damage Evolution, Volume 5: Proceedings of the 2014 Annual Conference on Experimental and Applied Mechanics (Vol. 5, pp. 145–151). Cham: Springer International Publishing
- Sherif, M., Ozbulut, O., Lanba, A., & Hamilton, R. F. (2014). *Self-Post-Tensioning for Concrete Beams Using Shape Memory Alloys*. In ASME 2014 Conference on Smart Materials, Adaptive Structures and Intelligent Systems: American Society of Mechanical Engineers
- Lanba, A., & Hamilton, R. F. (2013). *NiTi-based SMAs for Self-Post-Tensioned Bridge Girders*. In American Society for Composites 28th Technical Conference. State College, PA
- Lanba, A., & Hamilton, R. F. (2012). *Localized Strain Morphology during the Martensitic Transformation in Trained Shape Memory Alloys.* In Proceedings of the 2012 Conference on Engineering Materials: Evaluation, Flaw Detection and Processing METLAB-SDSU. Brookings, SD

Invited Oral Presentations

- *Revealing Morphology of Biological Systems via Laser Ablation Tomography*, Division of Plant Sciences Seminar Series Spring 2021, University of Missouri, March 3, 2021
- *Laser Ablation Tomography (LATscan) for Imaging and Analysis of Biological Samples, Bioscience Association of Maine (BioME) Coffee Hour, August 20, 2020*
- *Three-Dimensional Analysis of Biological Systems via a Novel Laser Ablation Technique,* ICALEO, Rosen Centre Hotel, Orlando, FL, USA, October 14-18,2018
- Influence of Pre-strain Level on Shape Memory Effect of NiTiNb alloys, SEM Midwest Graduate Student Symposium on Experimental Mechanics, University of Michigan, Ann Arbor, MI, USA, May 24-25, 2014
- NiTi-based SMAs for Self-Post-Tensioned Bridge Girders, American Society for Composites 28th Technical Conference, State College, PA, USA, September 9-11, 2013
- Martensitic Transformation Morphology and Tailoring Wide Hysteresis Shape Memory Alloys, Materials
 Science and Technology 2013 Conference and Exhibition, Montreal, Quebec, Canada, October 27-31, 2013

- Localized Strain Morphology during the Martensitic Transformation in trained Shape Memory Alloys, Conference on Engineering Materials: Evaluation, Flaw Detection and Processing, South Dakota State University, Brookings, SD, USA, May 17-19, 2012
- *In-situ Characterization of the Martensitic Transformation Morphology in Shape Memory Alloys,* 9th Graduate Research Symposium in Department of Engineering Science and Mechanics, State College, USA, February11, 2012

Invited Poster Presentations

- The Shape Memory Effect in Cast and Processed NiTiNb Alloy Microstructures, Materials Day at the Pennsylvania State University, State College, PA, USA, October 2014
- *Self-Post-Tensioned Concrete Using Shape Memory Alloys for Bridge Girders,* Center for Acoustics and Vibration Workshop, State College, PA, USA, 2014
- Localized Strain Morphology during the Martensitic Transformation in trained Shape Memory Alloys, Center for Acoustics and Vibration Workshop, State College, PA, USA, 2012
- In-situ Characterization of the Martensitic Transformation Morphology in Shape Memory Alloys, 9th Graduate Research Symposium in Department of Engineering Science and Mechanics, State College, USA, February 11, 2012
- *Energetic Analysis of the Thermal-Induced Martensitic Transformation in NiTi,* 8th Graduate Research Symposium in Department of Engineering Science and Mechanics, State College, USA, February, 2012

Honors and Awards

- Faculty Senate Award USM for Excellence in Teaching, Scholarship, University Service, and Community Service 2020
- Invent Penn State Audience Award for LAT 2016
- Dr. Sabih & Mrs. Güler Hayek Graduate Scholarship for Academic Excellence 2011
- KlingStubbins Engineering Graduate Scholarship 2010
- SIA-NOL Undergraduate Scholarship 2005-2009

Reviewer - Journals

- Materials
- Coatings
- Metallography, Microstructure, and Analysis
- Advances in Science and Technology
- Applied Sciences
- Buildings

CARLOS L. LÜCK, PH.D.

$Engineering \ Department-University \ of \ Southern \ Maine-Gorham, \ ME \ 04038$

Tel. (207) 780-5583 - e-mail: carlosl@.maine.edu

EDUCATION	 Ph.D. in Electrical Engineering – University of Southern California, 1995. M.S. in Computer Engineering – University of Southern California, 1992. B.S. in Electrical Engineering - Power Systems – Univ. São Paulo. Brazil, 1988. B.S. in Electrical Engineering - Electronics – Univ. São Paulo. Brazil, 1987.
EXPERIENCE	University of Southern Maine – 1995 to present Coordinator of the Robotics and Intelligent Systems Laboratory since 1999. Associate Professor of Electrical Engineering since 2001 Department Chair – 2003 to 2006
	Department Chair – 2019 to present University of Southern California – 1991 to 1995 Robotics Instructor and Laboratory Manager.
	Equitron – Electro-Mechanic Automation Ltd, Brazil – 1989 Design Engineer – pneumatic control and power regulators
	University of Darmstadt, Germany – 1988 Design Engineer – pneumatic control and power regulators.
PUBLICATIONS	"Multimeter Design Kit for Circuit Theory Education," Proceedings of the 2019 ASEE Zone 1 Conference, Niagara Falls, NY, 2019.
	"Teaching Robotics Through Self-Directed Learning (Or Is It The Other Way Around?)," Proceedings of the 2016 ASEE Northeast Section Conference, Kingston, RI, 2016.
	"Progress with a Synergistic Mechanical Engineering Degree Program", Proceedings of the 2012 ASEE Northeast Section Conference, Lowell, MA, 2012.
	"Synergy Approach to a New Mechanical Engineering Degree Program", <i>Proceedings of the ASEE Spring 2009 Northeast Conference</i> , Bridgeport, CT, 2009 (with J. Smith).
	"Identifying the Failure-Tolerant Workspace Boundaries of a Kinematically Redundant Manipulator," by Rodney Roberts, Rodrigo Jamisola and Anthony Maciejewski, Proceedings of the 2007 IEEE International Conference on Robotics and Automation, Rome, Italy, 2007 (collaboration).
	"Topology," article submitted for publication in the <i>Encyclopedia of Electrical Engineering and Electronics</i> , John Wiley & Sons, under peer review.
	"Simubot Version 3.0" for the SIMUBOT Software Package under License with Questech, Inc., University of Southern Maine, May 2004.
	"Intelligent Fixturing for Precision Manufacturing," Proceedings of the <i>IASTED</i> <i>International Conference on Applied Modelling and Simulation</i> , November 2002, Cambridge, MA.
	"A Graphical Teaching Tool for Understanding Two's Complement," publication in the <i>ERIC - Educational Resources Information Center</i> , maintained by <i>The National Library of Education</i> , December 2000.

Curriculum Vitae: Carlos Lück

"Simubot Version 2.0" for the *SIMUBOT Software Package under License with Questech, Inc.*, University of Southern Maine, May 2000.

"A Graphical Teaching Tool for Understanding Two's Complement," Proceedings of the 1998 International Conference on Engineering Education, Rio de Janeiro, Brazil, 1998.

"Dexterity of Redundant Robotic Manipulators in the Presence of Kinematic Constraints," *Proceedings of the International Conference on Combinatorics, Information Theory and Statistics*, Portland, Maine, 1997.

"Topology-Based Discretization for Modeling and Path Planning Optimization of Redundant Robotics Manipulators," Proceedings of the *International Conference on Combinatorics, Information Theory and Statistics*, Portland, Maine, 1997.

"Self-Motion Representation and Global Path Planning Optimization for Redundant Manipulators through Topology-Based Discretization," *Journal of Intelligent and Robotic Systems*, Vol. 19, No. 1, pp. 23-38, May 1997.

"Robot Cartography: A Topology-Driven Discretization for Redundant Manipulators," Proceedings of the *IEEE International Conference on Robotics and Automation*, Minneapolis, Minnesota, 1996.

"Topology-Based Analysis for Redundant Manipulators under Kinematic Constraints," Proceedings of the *34th IEEE Conference on Decision and Control*, New Orleans, Louisiana, 1995 (with S. Lee).

"Redundant Manipulators under Kinematic Constraints: A Topology-Based Kinematic Map Generation and Discretization," Proceedings of the *IEEE International Conference on Robotics and Automation*, Nagoya, Japan, 1995 (with S. Lee).

"A Topology-Based Space Discretization Method for Global Path Planning of Redundant Manipulators," Proceedings of the ANS 6th Topical Meeting on Robotics and Remote Systems, Monterey, California, 1995.

"Symbolic Jacobian Inversion for Redundant Manipulators with an 8-DoF Case Study," *Proceedings of the American Nuclear Society 6th Topical Meeting on Robotics and Remote Systems*, Monterey, California, 1995.

"The Semi-Singularity and a Topology-Based Global Path Planning Approach for Redundant Manipulators," Proceedings of the *IEEE/RSJ/GI International Conference on Intelligent Robots and Systems*, München, Germany, 1994 (with S. Lee).

"Global Path Planning of Redundant Manipulators Based on Self-Motion Topology," Proceedings of the *IEEE International Conference on Robotics and Automation*, San Diego, California, 1994 (with S. Lee).

"Self-Motion Topology for Redundant Manipulators with Joint Limits," Proceedings of the *IEEE International Conference on Robotics and Automation*, Atlanta, Georgia, 1993 (with S. Lee).

SOCIETIES AND
HONORSUniversity of Southern Maine Faculty Senate Award –Excellence in Service, 2012.Session Chair – IEEE International Conference on Robotics and Automation, Rome,
Italy, April 2007.

Session Chair – IASTED International Conference on Applied Modelling and Simulation, Cambridge, MA, November 2002.

Curriculum Vitae: Carlos Lück

University of Southern Maine Faculty Senate Award - Excellence in Teaching, 2002.

Questech's Microbot Advisory Board – 2000 to present.

Nelson & Small Prize, for special contributions to the University of Southern Maine Electrical Engineering Program. May 1999.

IEEE – The Institute of Electrical and Electronics Engineers, 1990 to present Robotics and Automation Society, 1990 to present USM IEEE Student Branch Advisor, 1995 to 2003, 2008 to present IEEE Maine Section Executive Committee, 1995 to 2003.

ASEE – American Society for Engineering Education – 1995 to present.

ASME – The American Society of Mechanical Engineers – 2004 to present USM ASME Student Section Advisor, 2008 to present.

IE – Instituto de Engenharia, São Paulo, Brazil. Valedictorian Honor Member, class of 1987, University of São Paulo.

PRODUCTSoftware License Agreement between the University of Southern Maine and Questech,**LICENSE**Inc. for the sale of *SIMUBOT*, a graphical simulator and kinematic controller for the
Teachmover Microbot Manipulator.

GRANTS "New Core Compliance Workshop," a USM Core Curriculum Course Development and Implementation grant proposal sponsored by the Office of Undergraduate Education, 5/30/2008. \$200. Funded.

NASA Equipment Grant: *LEGO Platform for SLAM investigation* (with N. Steier). 2006-2007. \$2,500. Funded.

NASA Equipment Grant: *Vision for an Autonomous Blimp* (with J. Petersen) 2006-2007. \$2,500. Funded.

NASA Scholarship: *SLAM with the LEGO Platform* (for N. Steier). 2006-2007. \$2,500 plus travel expenses to the Jet Propulsion Laboratory, Pasadena, CA. Funded.

MSGC NASA Summer Funding: *Feasibility Study of SLAM with the LEGO Platform* (with N. Steier). Summer 2006. \$500. Funded.

Maine Technology Institute Seed Grant: *Stereotactic Frame for Brain Surgery* (Principal Investigator: J. Florman, MD). 2003. \$12,080. Funded.

NASA Scholarship: *Design and Control of Biologically Inspired Wings with Active Deformation* (for C. Chicoine). 2002-2003. \$2,500 plus travel expenses to the NASA Langley Research Center, Virginia. Funded.

NASA EPSCoR 2000 Competition: *Autonomous Navigation with Visual Servoing*. 2001-2003. \$616,740. Not funded.

NASA Scholarship: *Autonomous Navigation and Workspace Mapping with the Rug Warrior Pro* (for J. Williams). 2001-2002. \$2,500 plus travel expenses to the Jet Propulsion Laboratory, Pasadena, CA. Funded.

Curriculum Vitae: Carlos Lück

NASA Scholarship: *Path Planning and Memory Recognition Development in Robotic Rover Vehicles* (for J. Quinby). 1999-2000. \$2,500 plus travel expenses to the Jet Propulsion Laboratory, Pasadena, CA. Funded.

CONSULTING GPS-911, LLC, Sensor-activated Wireless Communications, Memphis, TN – 2006-2007.
 Caron Engineering, Wells, Maine – 2002-2003.
 Jeffrey Florman, MD, Neurosurgery Associates, Portland, Maine – 2003-2005.

Updated 3/31/2021.

Page 4

Michael P. Davis, Ph. D.

57 Libby Lane • Brunswick, ME 04011 • (207) 891-8620 • michael.p.davis@maine.edu

OBJECTIVE	Contribute to continual improvement of undergraduate enginee project based learning and curricular integration.	ring education through
EXPERIENCE	 University Of Southern Maine Lecturer in Mechanical Engineering Courses taught: Strength of Materials (including laboratory) Engineering Mechanics: Statics & Dynamics Junior Design Project First year Entry-Year-Experience course focusenvironmental issues Introduction to MATLAB programming 	(2015-present) using on energy and
	 University of Maine Orono Lecturer, Brunsiwck Engineering Program Developed 30 credit hours of engineering curriculum, int physics, and engineering mathematics in project-based co. Courese taught/developed: Integrated Engineering I 10 ch (equiv of Calc prog. in MATLAB) Integrated Engineering II 9 ch (equiv of Calc prog. in C) Integrated Engineering III 6 ch (equiv of Diffication Contegrated Engineering IV 5 ch (equiv of Calc STEM outreach to secondary education through high sch robotics events, and engineering expos. 	(2012-2015) egrating computing, burses. I, Physics I, comp. II, Physics II, comp. È Eq, Linear Algebra) c III) ool visits, hosting of
	 Bath Iron Works Senior Engineer, Mechanical Engineering Analyst for complex computational heat transfer, fluid m dynamics applications Responsible for critical ship systems, including gas turbin turbine intake/exhaust ducting, shaft and bulkhead seals, generators Instructor for BIW Apprenticeship program, creating and gas turbines for Marine Engineering Course 	(2008-2012) echanics, and ne generators, gas and emergency diesel delivering lectures on
	 Southern Maine Community College Adjunct Professor Developed new 3 credit hour "Introduction to Marine De the fall of 2010 in partnership with BIW. Instructor for first offering of the class in the fall semeste Taught course lectures to SMCC faculty for subsequent of Pratt and Whitney, East Hartford Connecticut 	(2010) sign" course offered in or of 2010 course offerings (2001-2006)
	 Controls and Diagnostic Systems Engineer Designed and verified engine system FADEC software to commercial engine program within budget and time sche Active role in process quality improvement (awarded P& appreciation award for contributions): Developed software tool to help digitize the software of Trained 5 offshore staff in certification tasks, reducing 	o support the PW6124 dule constraints W employee design process certification costs

 University of Notre Dame, Notre Dame Indiana Ph. D., Mechanical Engineering GPA 3.93/4.0 (2008) Dissertation: "Experimental Characterization of Aviation Fuel Cavitation" Teaching Assistant TA for variety of courses, including Fluid Mechanics, Thermodynamics, and Introduction to Aerospace Engineering Research Assistant Partnered with Honeywell, INC to improve fuel pump reliability inhibited by cavitation damage Designed and constructed fuel cavitation test bench to validate Honeywell multi-phase flow design guidelines
 Worcester Polytechnic Institute, Worcester Massachusetts M.S., Mechanical Engineering GPA 3.81/4.0 (2001) Thesis: "Low Order Modeling of Freely Vibrating Flexible Cables" Teaching Assistant TA for variety of courses, including Statics, Strength of Materials, Machine Design, and Control Systems Research Assistant Designed and fabricated water tunnel experiments to study free cable vibration Developed Labview model to simulate free cable vibration for implementation of control strategies
University of Notre Dame, Notre Dame Indiana(1998)B.S. Cum Laude Aerospace Engineering GPA 3.53/4.0(1998)Work Study:•• Tutor for general chemistry and organic chemistry• Department of Mechanical Engineering summer internActivities:• Sigma Gamma Tau (Aerospace Honor Society)• Tau Beta Pi (Engineering Honor Society)• AIAA Student Member• University Marching Band
 Dunn, Patrick F. and Davis, M. P. Measurement and Data Analysis for Science and Engineering (4th ed). CRC Press, December 2017. Friess, W.A., and Davis, M.P. First cohort student retention challenges in a startup program. Proceedings of LACCEI conference Guayaquil, Ecuador, July 2014. Friess, W.A.,Davis, M.P. and Faulhaber, C. First and Second Year Common Projects for Curricular Integration. Proceedings of Canada International Conference on Education (CICE-2014), Cape Breton University, Nova Scotia, Canada. June 2014. Davis, M.P., and Friess, W.A. Development, implementation and assessment of a common first year end-of-semester engineering design project in an integrated curriculum. Proceedings of IEEE Frontiers in Education Conference, Oklahoma City. October 2013 Dunn, Patrick F., Flint O. Thomas, Michael P. Davis and Irina Dorofeeva, Experimental Characterization of Aviation-Fuel Cavitation, <i>Physics of Fluids</i> 22, 2010. Davis, Michael P., Dunn, Patrick F., and Flint O. Thomas. Jet Fuel Cavitation in a Converging Diverging Nozzle. Proceedings of the 45th AIAA Aerospace Sciences

AMARPREET S. KOHLI, Ph.D.

Associate Professor of Operations & Supply Chain Management School of Business, College of Management & Human Service University of Southern Maine amarpreet.kohli@maine.edu, 207-780-4305 <u>https://usm.maine.edu/school-of-business/amarpreet-kohli</u>

EDUCATION

Massachusetts Institute of Technology, MA

Executive Program – Artificial Intelligence: Implications for Business Strategy (2020)

University of Louisville, KY

Ph.D. in Industrial Engineering (2005) Speed Scientific School - **4.0/4.0**(G.P.A)

AIMA, Delhi (India) Master's in Business Administration (2000)

Bangalore University, Bangalore (India)

Bachelor of Mechanical Engineering with **distinction** R.V. College of Engineering, Bangalore University (1994)

ACADEMIC TEACHING EXPERIENCE

2012 – Present	Associate Professor (Tenured), Operations and Supply Chain Management, School of Business, University of Southern Maine, ME
	Graduate Course Instruction Supply Chain Management (MBA 672)
	<u>Undergraduate Course Instruction</u> Production and Operations Management (BUS 375) Supply Chain Management (BUS 372)
2006 - 2012	Assistant Professor, Operations and Supply Chain Management, School of Business, University of Southern Maine, ME
	<u>Graduate Course Instruction</u> Supply Chain Management (MBA 672) Probability and Statistics (MBA 504)

<u>Undergraduate Course Instruction</u> Production and Operations Management (BUS 375) Applied Business Analysis/Business Statistics (BUS 275)

2005 – 2006 Assistant Professor, Operations Management, Southwestern College, KS

<u>Graduate Course Instruction</u> Operations Management (MGMT 640)

<u>Undergraduate Course Instruction</u> Supply Chain Management (BUS 445) Operations Management (BUS 390) Quantitative Methods/Management Science (BUS 318)

Teaching Interests

Undergraduate Coursework

Operations Management, Supply Chain Management, Quantitative Methods (Management Science), Production and Inventory Control, Fundamentals of Quality Control, Business Statistics, Data Analytics

Graduate Coursework

Operations Management, Supply Chain Management, Advanced Quantitative Methods, Design of Experiments, Data Analytics

Partnership in Teaching

Courses I teach involve student projects within the business community, listed below are some of the projects completed by my students:

- Consumables Forecasting & Inventory Management at Texas Instruments (TI).
- Improving ROI, Profit & Customer Service at LAI International, Scarborough, ME
- Reducing chemical waste at the East End Wastewater Treatment Plant: A supply chain optimization strategy study, Portland, ME
- Study of Demand Forecast and Inventory Policy Models at US Cellular® Corp
- Implications of Channel Shift on Multi-Channel Retailers (Case Study) at L. L. Bean, Freeport, ME
- Qualitative to Quantitative Supply Chain Management Decisions at Fetch Enterprises, LLC, Portland, ME
- Compact Fluorescent Light Bulbs and Proper Recycling Programs to Avoid an Ecological Disaster
- Determine the Effectiveness of Shipyard's SCM: Forecasting of its Demand in the Northeast and Location of its Distributors at Shipyard Brewing Company, Portland, ME

- Downstream Defenders in the Northwest with Focus on Production, Assembly, and Delivery Logistics Surrounding the Downstream Defender® (an advanced vortex separator product) at Hydro International, Portland, ME
- Analysis and Recommendations of the Sales and Operations Planning (S&OP) Process at Fairchild Semiconductor, Portland, ME
- Development of Green Coffee Demand Forecast Model by Apply Holt's Linear Exponential Smoothing and Optimize Coffee Projections by Running a Newsboy Analysis for Each of the 9 months of Data at X Café, Portland, ME
- L. L. Bean Sporting Goods Specialty Shops Recognizing the constraints of the current processes identifying where improvements can be made using vendor managed inventory, L. L. Bean, Freeport, ME
- Explore the Use of RFID Technology in the Hannaford Supply Chain at Hannaford Bros. Inc., Scarborough, ME

RESEARCH

Research Interests

- New innovative technologies in supply chain and operations including Blockchain, Artificial Intelligence, RFID and Cloud Computing
- Supply Chain Collaboration and related technological integration using empirical modeling.
- Interdisciplinary empirical research within other business disciplines and other areas related to DEI, teaching, and self-compassion.

Refereed Journal Publications and Proceedings (Accepted/Published)

- Kohli, H.K., Wampole, D., Kohli, A.S., Peng, C & Polyakova, D. (2022). Association between self-compassion and demographics of university students adjusted by gratitude (accepted in *International Journal of Progressive Education*).
- Xu, Z., Vail, C., Kohli, A.S. & Tajdini, S. (2021). Measuring Brand Positioning and Marketing Strategies through Information Fusion: A Framework based on Relationship Marketing, *Journal of Marketing Analytics*, Volume 9, Issue 1, Pages 3-16.
- Kohli, H.K., Wampole, D. & Kohli, A.S. (2021). Impact of Online Education on Student Learning during the Pandemic, *Studies in Learning and Teaching*, Volume 2, Issue 2, Pages 1-11
- Stephenson, C., Xu, Z., Chen, J., Kohli, A.S, Sedler, E. & Johnson, K. (2018). Social Networking and Event Attendance: Identifying the Underlying Factors. *AMA Summer Academic Conference*, Chicago, IL.
- Kohli, A.S. & Peng, C. (2017) Factors affecting willingness of Industries to adopt RFID, *International Journal of Information Systems and Supply Chain Management*, Volume 10, Issue 3, Pages 24-43

- Kohli, H.K., Ross, F., Kohli, A.S. & Peng, C. (2016). Universal-Diverse Orientation of Business, Education, and Social Work students, *International Journal of Management in Education*, Volume 10, Issue 2, Pages 111-130
- Kohli, A. S. & Hawkins, E. (2015). Motivators to adopt Green Supply Chain Initiatives, *International Journal of Information Systems and Supply Chain Management*, Volume 8, Issue 4, October-December, Pages 1-13
- Kohli, A.S. (2012). Closed-Loop Supply Chain (CLSC) Practices: Motivators and Pressures for Businesses, *International Journal of Research in Management*, Economics and Commerce, Volume 2, Issue 11, November, Pages 525-533
- Kohli, A. S., Peng, C., & Mittal, P. (2011). Predictors of Student Success in Undergraduate Business Statistics Course, *Journal of Academy of Business and Economics*, Volume 11, Number 4, Pages 32-42
- Hawkins, E., & Kohli, A. S. (2011). Green Supply Chains: Key Drivers for Participation. *Decision Sciences Institute (DSI) Annual Conference*, Boston, MA
- Kohli, A. S. & Jensen, J. (2010). Assessing Effectiveness of Supply Chain Collaboration: An Empirical Study, *Supply Chain Forum: An International Journal*, Volume 11, Number 2, Pages 2-16
- Kohli, A. S. & Gupta, M. S. (2010). Improving Operations Strategy: Application of TOC Principles in a Small Business, *Journal of Business & Economics Research*, Volume 8, Number 4, Pages 37 46
- Kohli, H. K., Kohli A. S., Huber, R., & Faul, A. (2010). Assessing Cultural Competence in Graduating Students, *International Journal of Progressive Education*, Volume 6, Number 1, Pages 6 – 27
- Kohli, A. S., Sharma, D. K., Gerold, J., & Pastorino, F. (2009). Application of TOC in U.S. Army's Recruiting Processes, *International Academy of Business and Economics* (*IABE*) Annual Conference, Las Vegas, NV
- Kohli, A. S., Sharma, D. K., Gerold, J., & Pastorino, F. (2009). Theory of Constraints: An Application in U.S. Army's Recruiting Process, *Journal of Academy of Business and Economics*, Volume 9, Issue 3, Pages 164 – 174
- Kohli, A. S., & Alexander, S., & Gupta, M. (2009). A Continuous Simulation Model to Analyze Effectiveness of CPFR (Collaborative Planning Forecasting & Replenishment), *International Conference on Value Chain Sustainability (ICOVACS)*, Louisville, KY
- Kohli, A. S., Gupta, M. S., & Alexander, S. (2009). Experimental Assessment of Collaboration in Automotive Supply Chain, *International Journal of Decision Science & Information Technology*, Volume 1, Issue 1, Pages 40 – 53
- Kohli, A. S., Alexander, S., & Gupta, M. S. (2008). A Dynamic Simulation Study to Assess the Impact of Collaboration on the Performance of a Supply Chain Subject to a Variety of Demand Environments, *The Journal of Management and Engineering Integration*, Volume 1, Issue 1, Pages 73 87
- Kohli, A. S. & Sharma, D. K. (2007). Supply Chain Management and its Impact on Operation Decisions, *International Journal of Effective Management*, Volume 4, Issue 1, Pages 47 – 64

- Gupta, M. S. & Kohli, A. S. (2006). Enterprise Resource Planning Systems and its Implications for Operations Function, *Technovation: The International Journal of Technological Innovation and Entrepreneurship*, Volume 26, Issue 5-6, Pages 687 696
- Kohli, A. S. & Alexander, S. (2006) Collaboration and its Impact on Supply Chain Dynamics. *Institute of Industrial Engineers (IIE) Annual Conference*, Orlando, FL

<u>Google Scholar:</u> 435 Citations, h-index 7, i10-index 6 <u>Research Gate Stats</u>: 24235 Reads

Refereed Journal Publications in Progress

- 1. Kohli, A., Kumthekar, N., Shah, P. & Jauch, R. Understanding the Determinants of Blockchain Adoption Using the TOE Framework and Threat Rigidity Theory (Revise and Resubmit, *Target: International Journal of Information Management*)
- 2. Amendah, E. R., Kohli, A., & Kumthekar, N. Impact of Financial and Non-Financial Constructs on Customer Lifetime Value (CLV): A Retailer's Perspective (Revise and Resubmit, *Target: Journal of Relationship Marketing*)
- 3. Kohli, A., Kumthekar, N., Shah, P. & Jauch, R. Does disruption readiness affect technology adoption? The specific case of Artificial Intelligence (*Target: Journal of Business Research*)
- 4. Kohli, A.S., Nkhalamba, S. & Xu, Z. (2022). Using Text Mining and Sentiment Analysis to Analyze Smart Watch Market (*Data Analysis Phase, Target: Information Processing and Management: An International Journal*)
- 5. Kumthekar, N., Kohli, A., & Verma, B. Firm performance, and dyadic elasticities (Data Analysis Phase, *Target: Journal of Operations Management*)
- 6. Kumthekar, N. & Kohli, A.S. (2022). Servitization in the Manufacturing Sector: A Qualitative Perspective (*Data Collection Phase, Target: Journal of Operations Management*)
- 7. Kohli, A.S. & Peng, C. (2022). Improving success of at-risk students using analytics (Data Analysis Phase, *Target: Decision Science Journal of Innovative Education*)

Professional Presentations

- Kohli, A., Kumthekar, N., Shah, P. & Jauch, R. To Adopt Blockchain Technology or Not: Is the Decision-Making Process Immune to COVID-19?, Paper presentation, *Decision Sciences Institute (DSI) Annual Conference*, November 2022 (Refereed).
- Kumthekar, N., Kohli, A., Shah, P., Jauch, R., & Record, N (2021). "Technology Adoption in the COVID Era: A TOE Perspective" Paper presentation, *Decision Sciences Institute (DSI) Annual Conference*, November 2021 (Refereed).
- Kumthekar, N., Kohli, A.S. & Zuckero, J. (2020). Servitization in the Manufacturing Sector: A Qualitative Perspective. Paper presentation, *DSI Annual Conference*, November 2020 (Refereed).
- Nkhalamba, S., Kohli, A.S. & Xu, Z. (2018). Using Text Mining to Analyze Consumer Brands Sentiments of Smart Watches. Paper presentation, *INFORMS Annual Conference*,

November, Phoenix, AZ (Non-Refereed)

- Stephenson, C., Xu, Z., Chen, J., Kohli, A.S, Sedler, E. & Johnson, K. (2018). Social Networking and Event Attendance: Identifying the Underlying Factors. *AMA Summer Academic Conference*, August, Chicago, IL (Refereed)
- Mcdonnell, J.; Vail, C.; Tomenko, V., Vogel, M.; Xu, Z. & Kohli, A.S. (2017). Relationship marketing meets web 3.0 – Understanding your customer segments and the online strategy. Paper presented at *DSI Annual Conference*, November, Washington DC(Refereed)
- Kohli, A.S. & Peng, C. (2016). Improving success of at-risk students. Paper presented at *DSI Annual Conference*, November, Austin, Texas, (Refereed)
- Kohli, A.S.; Kohli, H.K & Peng, C. (2015). Measuring Interculture Competence Among Business, Education and Social Work Students. Paper presented at *INFORMS Annual Conference*, November, Philadelphia (Non-Refereed)
- Kohli, A.S. (2014). Current Trends and Willingness to adopt RFID: An Empirical Study, Paper presented at *DSI Annual Conference*, November, Tampa, Florida (Refereed)
- Kohli, A.S. (2012). Closed-Loop Supply Chain (CLSC) Practices: Motivators and Pressures for Businesses. Paper presented at *International Conference for IT & Business Intelligence*, Bhubaneswar, India, November 2012 (Refereed)
- Hawkins, E., & Kohli, A. S. (2011). Green Supply Chains: Key Drivers for Participation. Paper Presented at *DSI Annual Conference*, Boston, Massachusetts, November 2011 (Refereed)
- Kohli, A. S. (2010). Predictors of Student Success in Entry-Level Undergraduate Business Statistics Course. Paper Presented at *Decision Science Institute (DSI) Annual Conference*, San Diego, CA, November 2010 (Non-Refereed)
- Kohli, A. S. (2010). Supply Chain Collaboration: When is it Effective, *LL Bean/Lee Surace Colloquium Series*, USM, March 2010 (Invited Speaker)
- Kohli, A.S. & Jensen, J. (2009). An Empirical Model to Assess the Effectiveness of Supply Chain Collaboration. Paper Presented at The Institute for Operations Research and the Management Sciences *INFORMS Annual Conference*, San Diego, CA, October 2009 (Non-Refereed)
- Kohli, A.S. & Alexander, S. & Gupta, M. (2009). A Dynamic Simulation Analysis of the Effectiveness of CPFR, Paper Presented by my co-author, *International Conference on Value Chain Sustainability (ICOVACS)*, Louisville, KY, October 2009 (Refereed)
- Kohli, A.S. (2008). Collaboration Effectiveness in an Automotive Service Parts Supply Chain. Paper Presented at *International Conference on Logistics and Supply Chain Management (ILSCM)*, Coimbatore, India, August 2008 (Refereed)
- Kohli, A.S. (2007). Supply Chain Management and its Impact on Operation Function. Paper presented at *Production and Operation Management Society (POMS) Annual Conference*, Dallas, Texas, May 2007 (Refereed)
- Kohli, A.S., & Alexander, S. (2006) Collaboration and its Impact on Supply Chain Performance. Paper Presented by my co-author, *Institute of Industrial Engineers IIE Annual Conference*, Orlando, Florida, May 2006 (Refereed)
- Kohli, A. S. (2005). A Dynamic Simulation Study to Assess the Impact of Collaboration
on Supply Chain Performance. Paper presented at *INFORMS Annual Conference*, San Francisco, CA, November 2005 (Non-Refereed)

- Kohli, A. S. (2003). System Dynamics Model to Study the Impact of CPFR on Supply Chain Performance. Paper presented at *Institute for Operations Research and the Management Sciences (INFORMS) Annual Conference*, Atlanta, October 2003 (Non-Refereed)
- Kohli, A. S. (2003). CPFR: Its Effect on Supply Chain Performance in the Presence of Contextual Moderators – A Dynamic Simulation Study. Poster presentation at the Ph. D. Colloquium, *System Dynamics Conference (Organized by MIT)*, New York, July 2003 (Non-Refereed)

Research/Training Grants

- RRF Rural Health and Wellbeing Grand Challenge Grant Programs on "Assessing Disparities in Access to Advanced Medical Device Therapy in Maine", CO-PI's (Asheesh Lanba, Nihar Kumthekar USM and Jennifer Crittenden, UMaine), UMS, \$30,000 (2021-2022)
- CCD Gap Funding Mini Grant, \$250 (Fall 2020)
- CCD/CTEL Faculty Technology Grant, \$250 (Spring 2020)
- Faculty Senate Research Grant on "Effect of innovativeness on the relationship between adoption of service-dominant view and firm performance in US manufacturing firms", coauthored by Professor Kumthekar, USM, \$3000 (Fall 2019 Spring 2020)
- USM Title III Mini Grant on Digital Marketing and Business Analytics Students Competition, coauthored by Professors (Xu, Heiser & Takeda) - \$1000 (Spring 2019)
- USM Community of Practice CTEL Grant \$1000 (Summer 2018)
- USM Title III Mini Grant on Digital Marketing and Business Analytics Students Competition, coauthored by Professors (Xu, Heiser, Suleiman & Griffin) - \$1000 (Fall 2017)
- CTEL Course Design Grant \$2000 (Spring 2013)
- Awarded Centre for Technology Enhanced Learning (CTEL) Grant on "Enhancing Collaborative Learning Using Smart Board 885ix Interactive Whiteboard System", coauthored by Professors Dean and Mittal, USM, \$5462 (2011)
- (CTEL) Emerging Technology Grant to develop quantitative support services using online tutoring, USM, \$5000, Unfunded (2009)
- Awarded "Teaching for Sustainability Grant", USM, \$500 (2008)
- Awarded "Provost Summer Writing Seminar", USM, \$1000 (2007)
- Awarded a CTEL Grant to develop an online course on Supply Chain Management (MBA 672), USM, \$2500/Self and \$1000/Department (2007)
- Investigator (Graduate Student) "Impact of CPFR on Supply Chain Performance" funded by Multidisciplinary Research Grant, Logistics and Distribution Institute, University of Louisville, Kentucky, \$10,000 (2003)

SERVICE

Service to the School of Business, USM

- Member, Undergraduate Curriculum Committee (Fall 2017 Present)
- Chair, Ad hoc P&T Policy Committee (Spring 2021- present)
- Chair, Faculty Senate Rewards Committee (Spring 2021)
- Member, Beta Gamma Sigma Induction Committee (Spring 2016 present)
- Member, Accounting Tenure Track Search Committee (Spring 2020)
- Member, Ad hoc Committee, New Management Major (Fall 2019 Spring 2020)
- Chair, Operations and Supply Chain Management Tenure Track search committee (Fall 2018)
- **Co-Chair & Faculty Advisor** for Business Analytics & Digital Marketing Student Competition & Summit (Fall 2017 Spring 2020)
- Faculty, Advisor, Operations, Supply Chain Management & Analytics (OSA) student club (Fall 2020 present)
- Faculty Representative, SAP University Alliance Associate Membership (Fall 2019 Present).
- Faculty Advisor, Student Poster Presentation at Thinking Matters (Spring 2018, Spring 2019, Spring 2020, Spring 2021)
- Member, Faculty Senate Rewards Committee (Spring 2020)
- Member, Accounting Tenure Track Search Committee (Fall 2017)
- Member Undergraduate Curriculum Review Task Force (Fall 2013 Spring 2015)
- Member, Undergraduate Business Curriculum Committee (Fall 2010 Spring 2017)
- **Partnered with Department of Technology Management** in developing curriculum of BS to MBA 3-2 program (Fall 2011 Fall 2012)
- Adjunct Faculty Coordinator for Business Statistics (Fall 2007 Spring 2015)
- Adjunct Faculty Coordinator for OM (Fall 2007 Present)
- Volunteer, Prospective Students (March 28 April Ist, 2016)
- Faculty Mentor, Adjunct Faculty Teaching Quantitative Business Courses (Applied Business Analysis & Operations Management) (Fall 06 Present)
- Member, Business Administration Program (Fall 2006 Present)
- Member, Quantitative Curriculum Committee (Fall 2006 Present)
- Member, MBA Curriculum Committee (Fall 2006 Present)
- Member, Graduate Faculty (Fall 2006 present)
- Volunteer, New Student Orientation (January 6th, 2011; May 28th, 2010)
- Member, MS/OM Tenure Track Faculty Search Committee (Fall 2010)
- Member, MS/OM Fixed Length Faculty Search Committee (Spring 2010)
- Member, Ad hoc Restructuring Committee for Discussion with College of Nursing and Health Professions (2009 2010)
- Volunteer, New Student Orientation (July 13th, 2009; January 7th, 2009)
- Volunteer, Prospective Students Week (April 13 25th, 2007)
- Member, Student Success Task Force (Summer 2007 Spring 2008)

College and University Service, USM

- **Co-Chair**, Hiring and Human Relations Committee (Fall 2020 Present)
- Member, Steering Committee Intercultural Diversity & Equity Council (IDEC) Fall 2020 Present
- **Member**, New American Credentialing Committee (President Office)
- Member, Industrial Engineering Major Curriculum Development
- Chair, Associate Vice President Equity, Inclusion, and Community Impact (AVPEICI) Search Committee (Spring 2020)
- Member, Leadership Team, Faculty & Staff of Color Association (FSOCA), USM (Summer 2020 Present)
- Member, FSOCA (Summer 2020 Present)
- Member, ITAC (Information Technology Advisory Council) Committee (Fall 2016 Present)
- Faculty Senator SB representative (Fall 2017 Spring 2019)
- Member, IDAC (Intercultural & Diversity Advisory Council) Committee (Spring 2018 Present)
- Member, Hiring & Human Relations Sub Committee of IDAC (Fall 2015 Present)
- Member, USM Diversity Council (Spring 2016 Fall 2017)
- Member, Graduate Council (Fall 2014 Spring 2017)
- Member, CMHS Competencies Committee (Fall 2013)
- Member, CMHS Diversity Committee (Fall 2012 Spring 2015)
- Member, International Advisory Committee (Fall 2012 Fall 2013)
- Member, CMHS Sounding Board, Faculty Development (Fall 2012 Fall 2013)
- Member, Authors Wall Committee (Spring 2011 Spring 2013)
- Mentor, Incoming Undergraduate Student (Fall 2009)
- Member, University Wide Scholarships and Awards Committee (Spring 2009 Spring 2010)
- Member, SB Representative on Russell Chair and Trustee Professor Selection Committee (Spring 2009 – Spring 2010)
- Member, Community of Practice for Online Course Development (Spring 2007- Present)
- Member, Faculty Senate Research Committee (Fall 2006 Spring 2012)
- Member, Informal University Wide Statistics Group (Fall 2006 Spring 2009)

External Business and Community Service

- Provide guidance to MBA students to conduct Applied Supply Chain Research Projects in the local business community including Hannaford, US Cellular Corp, LL Bean, Shipyard Brewing Company, Fetch Dog, Fairchild Semiconductor and Green Coffee (Spring 2008 – Present)
- Advisory Board Member, Math & Science Mentoring Alliance (October 2009 Fall 2013)
- Partnered with National Association for the Advancement of Colored People (NAACP) for prayer during the Human Rights Day Program at USM (December 8th, 2009)

- Shared my story as a recent immigrant of Maine (Published as Chapter 4 of the book titled "New Mainers: Portraits of Our Immigrant Neighbors", Tilbury House Publishers, Gardiner, Maine (2009) by the authors (Jan Pieter van Voorst van Beest and Pat Nyhan)
- Statistical Analysis Project for IDEXX to investigate whether there is a statistically significant difference in the proportions of positives between regions for various diseases (2008)
- Statistical Analysis Project for IDEXX to determine performance of the SNAP® Feline TripleTM test kit compared to the current test methods (2007)
- Volunteer Member, Indian Association of Maine (2006 Present)
- Presentation on "Comparative Religions" in Southwestern College, KS (2006)
- Service to the Profession
- Member, Editorial Review Board, International Journal of Business Intelligence and Systems Engineering (IJBISE) (2014 Present)
- Member, Editorial Review Board, International Journal of Information Systems and Supply Chain Management (IJISSCM) (2011 Present)
- Reviewer, International Journal of Production Research (IJPR) (2011 Present)
- Reviewer, (IJISSCM) (2011 Present)
- Reviewer, DSI Innovative Education Track (2011)
- Reviewer, Journal of Global Information Technology (2010 Present)
- Member, Editorial Board, Global Digital Business Association, Inc. (April 2008 Present)
- Foreign Examiner for Ph.D. Thesis Valuation for a student at Visveswaraya Technological University, Bangalore, Karnataka, India (2009).
- Chair, Technical Session titled "SCM Practices" at International Conference on Logistics and Supply Chain Management (ILSCM), Coimbatore, India (August 2008)
- Participant in Panel Discussion at International Conference on Logistics and Supply Chain Management (ILSCM), Coimbatore, India (August 8th, 2008)
- Foreign Examiner for Ph.D. Thesis Valuation for student at Department of Mechanical Engineering, S. J. College of Engineering, Mysore, Karnataka, India (2007)
- Member, Library Promotion Committee, Production and Operation Management Society (POMS) (December 2006 April 2007)
- Reviewer, Industrial Engineering Research Conference (IERC) Proceedings (2006)

AWARDS AND HONORS

- Awarded School of Business Faculty Senate Research Award for Excellence in Service (2019)
- Member of Beta Gamma Sigma (2015 Present)
- Awarded School of Business Faculty Senate Research Award for Excellence in Intellectual Contributions (2011)
- Awarded School of Business Outstanding Professor of the Year Award for Teaching by Dean List of Business Students (2010)
- Nominated for School of Business Faculty Senate Research Award (2010)
- Nominated for School of Business Faculty Senate Teaching Award (2009)

- Member of Phi Kappa Phi Honors Society (2005)
- Second Prize for Best Exhibit, Engineers Day, Department of Industrial Engineering, University of Louisville (2003)
- Runners Position, College Basketball Competition, R. V. College of Engineering, Bangalore, India (1993)
- First Position, Scholarship Award, High School, New Delhi, India (1987)
- First Position, Mathematics Olympiad, High School, New Delhi, India (1987)
- First Prize, Camlin Students Mathematics Talent Contest, Delhi, India (1986)

PROFESSIONAL AFFILIATIONS

- Member, Production and Operations Management Society (POMS)
- Member, Decision Sciences
- Member, System Dynamics Society
- Member, Institute of Operations Research and Management Science (INFORMS)
- President and Founder of INFORMS Student Chapter, University of Louisville (2003-04)

INDUSTRY EXPERIENCE

2004

Graduate Intern, Lean Quest (Lean Management Consulting Company), Huntington Beach, California

Responsible for development of simulation models and manuals to help the consultants in the lean management training workshops

Accomplishments:

- Developed inventory management simulation models based on lean and traditional concepts
- Developed Instruction Manuals for Lean Consultants

1999-2000 Sr. Engineer, Hindalco Industries Ltd. (Largest Aluminum Company in Asia and part of \$41 Billion Aditya Birla Group), New Delhi, India

> Responsible for product development, sales and distribution of Alloy Wheel Rims All over India, reporting to Sr. Vice President (Marketing)

Accomplishments:

- Developed and implemented sales and distribution strategies in aftermarket, original equipment manufacturers (G.M, Daimler Benz, Hyundai, Honda), and export market
- Developed a customized sales distribution system with I.T support Helped company achieve 20% market share in the first year of commercial production

1995-1998Assistant Manager, Escorts Mahle Ltd. (Automotive Engine Components),
part of \$4.6 Billion Escorts Group, New Delhi, India

Responsible for providing product support to Original Equipment Manufacturers, After Market, Railways and State Transport

Accomplishments:

- Improved zonal market share by 15 20%
- Reduced warranty complaints from 1.2% to 0.5% in railway division and 2.0% to 0.6% in after-market
- Coordinated with the manufacturing plant in new product developments to improve the product performance by 5-10%

1994-1995

Graduate Engineer Trainee, Q. H. Talbros Ltd (Automotive Suspension Components), Gurgaon, India

Responsible for quality assurance testing and final inspection

Accomplishments:

- Initiated control chart techniques and other statistical quality control measures at worker and supervisor levels
- Improved product quality of incoming raw material through
- technical support and helped the company in achieving IS0 9001 certification

Other Industry Projects

- Inventory Management System for a sports goods company using Oracle as back-end and Developer 6.0 as front-end (2001)
- 'Assessment of demand for Heat Exchangers' in India (2000)
- 'Design and Development of Robotic End-Effectors' at Indian Space Research Organization (I.S.R.O), Bangalore (1994)

1990 -1994 Director, Business Development, Kwality Spares (India)

PROFESSIONAL DEVELOPMENT

- Workshop on Best Practices for Diversity, Equity, and Inclusion in Research (Spring 2021)
- Workshop on Best Practices to Promote Racial and Social Equity in the Workplace (Fall 2020)
- SAP University Alliances Year End Event (Fall 2020)
- Workshop on the Challenges of Recruiting and Retaining Diverse Faculty and Administrators (Fall 2020)
- Brightspace Training Workshop (Summer 2020)

- Artificial Intelligence: Implications for Business Strategy, online course from MIT (Spring 2020)
- Maine Center Ventures Steering Committee Presentation (December 2018, Feb 2019)
- USM Advising Workshop (October 27th, 2017)
- Open Data Science Workshop (May 4th May 5th, 2017)
- Community Inclusion Training (April 21st, 2017)
- Data Analytics Workshop, UNC-Chapel Hill (June 20th June 22nd, 2016)
- One Week Workshop on Structural Equation Modeling, University of Connecticut, Storrs (July 16th July 20th, 2012)
- Three days Institute on Collaborative Teaching, Research and General Education organized by the Provost Office, USM (May 23rd May 25th, 2011)
- Faculty Technology Showcase hosted by Center for Teaching Enhanced Learning (CTEL), USM, November 12th, 2010)
- Introduction to the Quality Matters Rubric Workshop (CTEL, USM, August 18th, 2010)
- Focus on Innovation Convocation (USM, February 11th & 12th, 2010)
- First Regional Sloan-C Conference (USM, October 30th, 2009)
- Using Technology in Teaching and Learning (4th Annual Showcase, May 8th, 2009)
- Two days Teaching for Sustainability Conference (USM, October 24th & 25th, 2008)
- Community of Practice and Illuminate Workshop (CTEL, USM, November 30th, 2007)
- Teaching Online: A Short Course for New Online Faculty (CTEL, USM, Fall 2007)
- Academic Advising's Integral Role in the Academic Success and Persistence of Students Webinar (USM, September 2007)
- Two Weeks Provost Writing Seminar (USM, Summer 2007)
- POMS Emerging Scholar Program (Dallas, Texas, May 2007)
- Five Weeks Online Development Course on Blackboard (CTEL, USM, Spring 2007)
- Assessment of Learning (AOL) Conference (SB, USM, March 16th, 2007)
- Clicking In: A Way to Improve Class Interaction (CTEL, USM, October 30th, 2006)
- Pedagogies of Diversity, Diversity of Pedagogy: Diversity and Scholarship at the Turn of the 21st Century (University of Maine System Faculty and Staff Workshop, USM, November 3rd, 2006)
- Teaching Effectiveness Colloquium (INFORMS, San Francisco, CA, 2005)
- SAP Training (40 hrs) by SAP University Alliance Program at (California State University, Chico, CA, 2005)

IT AND ANALYTICALSKILLS

Mac, Windows, Novell Netware
Oracle, MS Access
R, SQL, PL/SQL, C
Developer (Forms 1 & 2), Reports, Java Developer
Powersim, Arena
POM, ExcelOM, Minitab, SPSS, MPL, GIS (Arc View), AMOS

CURRICULUM VITAE

Muhammad El-Taha

Home Address	Campus Address
6 Juniper Ln	Department of Mathematics & Statistics
Falmouth, ME 04105	University of Southern Maine
	Portland, ME 04104-9300
Phone: H: (207)781-0917	O: (207)780-4564
Email: el-taha@maine.edu	

Professional Experience

Academic			
Year(s)	Institutions	Positions	
1998-	University of Southern Maine	Professor	
1993-98	University of Southern Maine	Associate Professor	
1987-93	University of Southern Maine	Assistant Professor	
1999-00	American University of Beirut	Visiting Professor	
	Engineering Management Graduate Program		
Spring 94	University of North Carolina,	Visiting Scholar	
	Chapel Hill	Department of Operations Research	
Summer 92	Institut National de la Recherche		
	Scientifique-Telecommunications		
	(INRS), Montreal, Canada	Visiting Scholar	
1991-	Department of Computer Science		
	University of Southern Maine	Adjunct Professor	
1982-87	North Carolina State University	Research/Teaching Assistant	
1981-82	American University of Beirut	Instructor	
1978-80	American University of Beirut	Teaching Assistant	

Administrative

Year(s)	Institutions	Positions
2016-2018	University of Southern Maine	Director, Graduate Program in
		Statistics
2012-2013	University of Southern Maine	Chair, Department of Mathematics
		and Statistics
2010-2011	University of Southern Maine	Chair, Department of Mathematics
		and Statistics
2007-2010	University of Southern Maine	Director, Graduate Program in
		Statistics
2000-2005	University of Southern Maine	Chair, Department of Mathematics
		and Statistics

2001-03	University of Southern Maine	Director, Graduate Program in Statistics	
Non-Academ	lic		
2006-Present	Provided statistical consulting to s and products. Also provided consu- care company.	several companies on health related issues ulting on call center management to a health	
2000-01	Provided unpaid consulting for Portland citizens to asses the risk to surroundings from blasting at Dragon Concrete Plant.		
1980-82	Statistical Analyst with Arabia Insurance Co.		
1992	Consulting with National Semiconductor on Wafer output rates		
1994	Consulting with National Semiconductor on improving manufacturing processes		
1997/1998	Consulting with Fairchild Semicon	ductor on inventory control problems	
1987-98	Consulting: several business and in Department of Labor	ndustry projects including US	

Educational Background

Years	Institutions	Degrees Awarded
1987	North Carolina State University,	Ph.D.
	(Operation Research)	
1980	American University of Beirut	M.S.
	(Statistics)	
1978	Haigazian College, Beirut	B.S.
	(Mathematics)	

Sample Consulting Projects

- Socioeconomic Status as a Determinant of Anti-Tumor Necrosis Factor Therapy in Patients with Rheumatoid Arthritis (RA) in the Consortium of Rheumatology Researchers of North America (CORRONA) Database
- Switching and Drug Survival Analysis of Infliximab and Other Biologics among RA patients
- Analysis of NARCOTIC among Crohns patients based on TREAT (Therapy, Resource, Evaluation, and Assessment Tool) Registry Database.
- Statistical Analysis on Use of Any-TNFs Based on RA Patient Record Database

- TNF alpha Antagonist Pattern Use in RA-Assessed on Yearly Basis since the Registrys Inception.
- Association of Biologics and Resource Utilization of RA patients Based on COR-RONA database.
- Concomitant Medications Utilization among RA Patients Based on CORRONA database.
- The CORRONA Registrys Representation of Rheumatoid Arthritis by Race.
- Optimal staffing of a call center for a national Co.
- Statistical analysis of compliance of Diabetic patients

Several of these consulting projects resulted in abstracts and Posters in ACR 2006 and Eular 2007 conferences.

Teaching Experience

Graduate Level: Statistics for Business, Queueing Networks, Computer Performance Modeling, System Simulation, Stochastic Processes, Dynamic Programming, Deterministic Modeling in Operations Research, Stochastic Modeling in Operations Research.

Undergraduate Level: Business Analytics, Quantitative Business Analysis, Management Science, Mathematical Modeling, Stochastic Processes, Simulation, Numerical Analysis, Linear Programming, Stochastic Modeling in Operations Research, Teaching Seminar, Introduction to Probability and Statistics, Business Statistics, Probability for Business, Calculus, Precalculus

Publications (Articles Published/Accepted)

- El-Taha M, "An Efficient Convolution Method to Compute the Stationary Transition Probabilities of the G/M/c Model and its Variants" 2021 10th IFIP International Conference on Performance Evaluation and Modeling in Wireless and Wired Networks (PEMWN), 2021, pp. 1-6, doi: 10.23919/PEMWN53042.2021.9664677.
- El-Taha M, and Michaud, T "An Efficient Convolution Algorithm for the Non-Markovian Two-Node Cyclic Network" Applied Mathematical Modelling (2021)pp.1-13,DOI: 10.1155/2021/5550363.
- El-Taha M, "A Discrete Workload Conservation Law with Applications to Discrete-Time Queueing Systems" *Queueing Models and Serice Management*, 2, pp. 124-152, (2019).

- B. Maddah and M. El-Taha "Analysis of a Two-Node Closed Queueing Cyclic Network with One Non-Exponential Node". *Computers and Industrial Engineering*, 110,pp. 297-316 (2017).
- El-Taha M, "A General Workload Conservation Law with Applications to Queueing Systems" *Queueing Systems: Theory and Applications*, 85, pp. 361-381, (2017).
- Anandarajah AP, El-Taha M,Peng C , and Ritchlin CT " The Relationship between Focal and Generalized Bone Loss in Rheumatoid Arthritis" *Current Rheumatology Reviews*, 13, PP. 152-157 (2016).
- El-Taha M, "Asymptotic Time Averages and Frequency Distributions" International Journal of Stochastic Analysis, (2016).
- El-Taha M, "Invariance of Workload in Queueing Systems" Queueing Systems: Theory and Applications, 83, pp. 181-192, (2016).
- B. Maddah, and El-Taha M, "Selective Trunk with Multi-Server Reservation" Advances in Operations Research, (2016)
- Clark M, and El-Taha M, "Some Useful Properties of Log-Logistic Random Variables for Health Care Simulations", *International Journal of Statistics in Medical Research*,4, pp.79-86(2015).
- El-Taha M, "Sample-Path Analysis of Queues with Batch Arrivals" Computers and Industrial Engineering, 70,pp.98-106 (2014).
- El-Taha M, "Theory of Probability, Basics and Fundamentals", *Encyclopedia of Social Network Analysis and Mining, Editors: Reda Alhajj, Jon Rokne*, Invited Submission. (2014).
- Fisher M, Hochberg M, El-Taha M, Kremer J, Peng C, , Greenberg J "Smoking, Smoking Cessation, and Disease Activity in a Large Cohort of Patients with Rheumatoid Arthritis" *The Journal of Rheumatology*, 39, pp.904-909(2012)
- M. El-Taha, "Sample-Path Analysis of Single-Server Queues with Multiple Vacations", *ISRN Applied Mathematics*.Published online, (2011).
- Anandarajah AP, El-Taha M, Peng C, Reed G, Greenberg J and Ritchlin CT " The Association between Focal Erosions and Generalized Bone Loss in Psoriatic Arthritis" Annals of the Rheumatic Diseases, 70, pp.1345-1347(2011)

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- B. Maddah, L. Moussawi, M. El-Taha, and H. Rida "Dynamic Cruise Ship Revenue Management" *European Journal of Operations research (EJOR)*,207, pp.445-455,(2010)
- B. Maddah, M. El-Taha and R. Abou Tayeh "Optimal allocation of Servers and Processing Time in a Load Balancing System" *Computers and Operations Research*, 37, pp.2173-2181(2010)
- M. El-Taha, "PASTA and Related Results", Wiley Encyclopedia of Operations Research and Management Science. Invited, published online, (2010).
- M. El-Taha "Departure Process in a Mixed Fork-Join Synchronization Network" Computers and Mathematics with Applications, 57 pp. 1272-1279 (2009)
- M. El-Taha and B. Maddah, "Allocation of Service Time in Multi- server Systems", Management Science, 52, pp.623-637(2006)
- M. El-Taha and B. Maddah, "Allocation of Service Time in Multi- server Systems", Management Science, On-line supplement, (2006)
- M. El-Taha and M. Jafar "Characterization of the Departure Process in a Closed Fork-Join Synchronization Network" *Applied Mathematics and Computation*,181, pp. 214-219 (2006)
- M. El-Taha and J. Heath, "Queueing Network Models of Credit-Based Flow Control", *Computers and Mathematics with Applications*, 50, pp.393-398 (2005)
- El-Haber and El-Taha, "Dynamic Two-Leg Airline Seat Inventory Control with Overbooking, Cancellations & No-Shows", Journal of Revenue & Pricing Management3, pp. 143-170 (2004)
- M. El-Taha, "Allocation of Service Time in a Two server System", Computers and Operations Research, 30, pp. 683-693 (2003)
- M. El-Taha, "A Sample-Path Condition for the Uniform Asymptotic Distribution of Clearing Processes", *Optimization*,51,6,pp. 965-975 (2002)
- M. Abou Najm, M. El-Fadel, M. El-Taha, G. Ayoub, and F. Al-Awar, "An Optimization Model for Regional Integrated Solid Waste Management I. Model Formulation" Waste Management and Research, 20, pp.37-46 (2002)

- M. Abou Najm, M. El-Fadel, G. Ayoub, M. El-Taha, and F. Al-Awar, " An Optimization Model for Regional Integrated Solid Waste Management II. Model Application and Sensitivity Analysis" *Waste Management and Research*, 20, pp.46-54 (2002)
- M. El-Taha and B. Maddah, "Joint Probability Distribution of Multiple Selective Trunk Reservation Systems", Proceeding of the 6th World Multiconference on Systemics, Cybernetics and Informatics: Mobile/Wireless Computing and Communications Systems, Vol IV, pp. 320-324, 2002.
- M. El-Taha, and S. Stidham Jr., "Filtration of ASTA: A Weak Convergence Approach", Journal of Statistical Planning and Inference, 100, pp 171-183 (2002)
- F. Mrad, E. Khayat, M. El-Taha, and K. Kelly, "PC-Based Instrumentation: Statistical System Error Calculator" IQM2001 Symposium: Intelligent Quality Management and Metrology, pp.940-948 (2001)
- M. El-Taha, and J. Heath, "Traffic Overflow In Loss Systems with Selective Trunk Reservation", *Performance Evaluation*, 41, 4, pp 295-306 (2000)
- M. El-Taha, "Parameter Estimation in a Right-Truncated Gamma Distribution", American Statistical Association, 1998 Proceedings of the Statistical Computing Section, pp 183-188, (1999)
- D. Clark, and M. El-Taha, "Generation of Correlated Logistic-Normal Random Variates for Medical Decision Trees", *Methods of Information in Medicine*, 37,pp 235-238, (1998)
- M. El-Taha, Stidham Jr., and R. Anand, "Sample-Path Insensitivity of Symmetric Queues in Discrete-Time" Nonlinear Analysis, Theory, Methods and Applications (Proceedings of the Second World Congress of Nonlinear Analysts, Athens,) 30:1099-1110, (1997)
- M. El-Taha, and J. Heath, "Overflow Traffic in Closed Queueing Models", *Stochastic Models*, 12, pp 493-506 (1996)
- M. El-Taha, "Pathwise Rate-Stability for Input-Output Processes", *Queueing Systems*, 22, pp 47-63 (1996)
- M. El-Taha, and S. Stidham Jr., "Sample-Path Stability Conditions for Multiserver Input-Output Processes", *Journal of Applied Mathematics and Stochastic, Analysis*, 7,pp 437-456 (1994)

- S. Stidham Jr., and M. El-Taha, "Sample-Path Techniques in Queueing Theory", Advances in Queueing, pp 119-166 (1994), editor: Dshalalow
- M. El-Taha, and S. Stidham Jr., "Sample-Path Analysis of Stochastic Discrete-Event Dynamic Systems", *Discrete Event Dynamic Systems*, 3, pp 325-246 (1993)
- M. El-Taha, "MVU Estimation in a Shifted Gamma Distribution with Shape Parameter a Known Integer", Communication in Statistics: Simulation and Computation, 22, pp 831-843 (1993)
- S. Stidham Jr., and M. El-Taha, "A Note on Sample-Path Stability Conditions for Input-Output Processes", *Operations Research Letters* 14, pp 1-7 (1993)
- M. El-Taha, "On Conditional ASTA: A Sample-Path Approach", Stochastic Models, 8, pp 157-177, (1992)
- M. El-Taha, and S. Stidham Jr., "Deterministic Analysis of Queueing Systems with Heterogeneous Servers," *Theoretical Computer Science*, 106, pp 243-264, (1992)
- M. El-Taha, and S. Stidham Jr., "A Filtered ASTA Property", Queueing Systems, 11, pp 211-222, (1992)
- M. El-Taha, and W. Evans, "A New Estimation Procedure for a Right-Truncated Exponential Distribution", *The 23rd Annual Pittsburgh Conference on Modeling and Simulation*, 23, pp 427-434 (1992)
- M. El-Taha, J. Heath, and W. Evans, "Approximate Analysis of Multiserver Queueing Models with Ranked Servers," In *Modeling and Simulation*, 22, eds. W. Vogt and M. Mickle, pp 607-614. Pittsburgh (1991)
- M. El-Taha, and S. Stidham Jr., "Sample-Path Analysis of Discrete-Event Dynamic Systems", *The 30th IEEE Conference on Decision and Control, Conference* proceedings, (1991)
- M. El-Taha, and J. Heath, "A Model of Channel Allocation in Multi-channel Local Networks," *Computers and Operations Research*, 18, pp 297-306, (1991)
- S. Stidham Jr., and M. El-Taha, "Sample-Path Analysis of Processes with Imbedded Point Processes," *Queueing Systems*, 5, pp 131-166, (1989)

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Publications (Published Abstracts in Refereed Proceedings)

These publications are joint work with researchers from CORRONA, CENTOCOR and Medical Schools in New York and Massacheussetts.

- Anandarajah AP, Greenberg J, **El-Taha M**, Peng C, Reed G, Greenberg J, Ritchlin CT. The relationship between erosions and osteoporosis in patients with psoriatic arthritis. Arthritis and Rheumatism. Annals of rheumatic diseases 2008;67:101
- Anandarajah AP, Greenberg J, **El-Taha M**, Reed G, Peng C, Ritchlin CT. The relationship between erosions and osteoporosis in patients with psoriatic arthritis. Arthritis and Rheumatism 2008;58(9):S366-S367.
- Fisher MC, **El-Taha M**, Kremer JM, Peng C, Greenberg J. Smoking cessation and improvement of RA disease activity. Arthritis and Rheumatism 2008;58(9):S610-S610.
- Anandarajah AP, Greenberg J, **El-Taha M**, Reed G, Peng C, Ritchlin CT. The relationship between erosions and osteoporosis in patients with psoriatic arthritis. Arthritis and Rheumatism 2008;58(9):S366-S367.
- Dabbous O, Kremer J, Rambharose J, **El-Taha M**, Reed G, Tang B, et al. Infliximab, etanercept, and adalimumab switchinu in patients with rheumatoid arthritis in the consortium of rheumatology researchers of North America (Corrona) database. Annals of the Rheumatic Diseases 2007;66:167-167.
- Dabbous O, Kremer J, **El-Taha M**, Reed G, Tang B, Thompson H, et al. Socioeconomic status as a determinant of Anti-TNF alpha therapy for rheumatoid arthritis patients: CORRONA database. Arthritis and Rheumatism 2006;54(9):S61-S62.
- Dabbous O, Kremer J, **El-Taha M**, Reed G, Tang B, Arjunji R, et al. Infliximab, etanercept and adalimumab switching in patients with rheumatoid arthritis in the consortium of rheumatology researchers of North America (CORRONA) database. Arthritis and Rheumatism 2006;54(9):S705-S705.
- Dabbous O, Kremer J, **El-Taha M**, Reed G, Tang B, Thompson H, et al. Socioeconomic status as a determinant of Anti-TNF alpha therapy for rheumatoid arthritis patients: CORRONA database. Arthritis and Rheumatism 2006;54(9):S61-S62.

Technical Reports on Research/Consulting Projects.

5.1

- Socioeconomic status as a determinant of anti-tumor necrosis factor therapy in patients with rheumatoid arthritis (RA) in the Consortium of Rheumatology Researchers of North America (CORRONA) Database. (with Cheng Peng), 2006.
- Analysis on use of NARCOTIC among Crohn's patients based on TREAT (Therapy, Resource, Evaluation, and Assessment Tool). (with Cheng Peng) 2006
- Switching and drug survival analysis of use Infliximab and other biologics among RA patients. (with Cheng Peng) 2006.
- Statistical Analysis on use of any TNF inhibitors based on RA Patient Record Database. (with Cheng Peng) 2006
- Disease activity among RA patients who have received TNF inhibitors and discontinued therapy. (with Cheng Peng) 2007.
- Statistical Analysis of the switchers problem Remicade Switchers Analysis for ACR07 (with Cheng Peng) 2007.
- TNF alpha antagonist pattern use in RA-assessed on yearly basis since the registry's inception. (with Cheng Peng), 2007
- Association of biologics and resource utilization of RA patients based on COR-RONA database. (with Cheng Peng), 2007
- Concomitant medication utilization among RA patients based on CORRONA database. (with Cheng Peng), 2007
- The CORRONA registry's representation of rheumatoid arthritis by race. (with Cheng Peng), 2007
- The Effect of Smoking Cessation on RA Outcomes (with Cheng Peng). 2008.
- The Relationship between Erosions and Osteoporosis in Patients with Psoriatic Arthritis (with Cheng Peng). 2008.

Books

• M. El-Taha, and S. Stidham Jr., "Sample-Path Analysis of Queueing Systems", Kluwer Academic Publishers, Boston, (1999) The book has been awarded the "1999 Best Publication Award" by the Applied Probability section of *INFORMS* (the Institute of Operations Research and Management Science). The award recognizes the most outstanding contribution to the field of Applied Probability.

Reviews that Appeared in Mathematical Reviews

- A review of "An Infinite-Server System with Levy Shot-Noise Modulations: Moments and Asymptotics" by M. Saxena, O.J. Boxma and M. Mandjes (2021)
- A review of "A queueing system with vacations after a random amount of work" by Ivo Adan, Ono Boxma, Dieter Claeys, and Offer Kella (2019)
- A review of "Personalized queues: the customer view, via a fluid model of serving least-patient first" by Avishai Mandelbaum and Petar Momcilovic (2018)
- A review of "MAP/M/c and M/PH/c queues with constant impatience" by Kenichi Kawanishi and Tetsuya Takine (2016)
- A review of "The Tail Behavior of A Longest-Queue-Served-First Queueing System: A Random Walk in the Half Plane" by Wenzhe Ye, Hui Li, and Yiqiang Zhao. (2015).
- A review of "Random-Order-of-Service for Heterogeneous Customers: Waiting Time Analysis" by W. Rogiest, K. Laevens, J. Walraevens, and H. Bruneel. (2015).
- A review of "A Batch Arrival Queue with Second Optional Service and Reneging During Vacation Periods" by YMonita Baruah, Kailash C Madan, and Tillal Eldabi. (2014).
- A review of "Queue Size Distribution and Capacity Optimum Design for N-policy Geo^{λ1,λ2,λ3}/G/1 with Setup Times and Variable Input Rate" by Yingyuan Wei, Miaomiao Yu, Yinghui Tang, and Jianxiong Gu. (2014).
- A review of "Reflecting Brownian Motion in Two Dimensions: Exact Asymptotics For the Stationary Distribution" by J.G. Dai and Masakiyo Miyazawa. (2013)
- A review of "The single server vacation queueing model with geometric abandonment" by Spiros Dimou, Antonis Economou, Demetrios Fakinos (2012)
- A review of "Continuity of the M/G/c queue" by Lothar Breuer (2009)

- A review of "A fluid model with upward jumps at the boundary" by Vidyadhar Kulkarni and Keqi Yan (2008)
- A review of "Structural interpretation and derivation of necessary and sufficient conditions for delay moments in FIFO multiserver queues" by Alan Scheller-Wolf and Rein Vesilo (2007)
- A review of "Asymptotic Analysis of Complex, Markov-Modulated Computer and Communication Systems" by J. Sztrik, Mathematical Reviews (2004)
- A review of "Analysis and Computation of the Joint Queue Length Distribution in a *FIFO* Single-Server Queue with Multiple Batch Markovian Arrival Streams", by H. Masuyama and T. Takine, Mathematical Reviews (2004)
- A review of "Sojourn times in a processor sharing queue with service interruptions, by R. Nunez-Queija" Mathematical Reviews (2001)
- A review of "Tail probabilities of low-priority waiting times and queue lengths in MAP/GI/1 queues, by Vijay Subramanian and R. Srikant" Mathematical Reviews (2001)
- A review of "On the number of refusals in a busy period, by Perkoz, Erol A." Mathematical Reviews (1999)
- A review of "The superposition of alternating on-off flows and a fluid model, by Palmowski, Zbigniew and Rolski, Tomasz" Mathematical Reviews (1998)
- A review of "On the Stability of Greedy Polling Systems with General Service Policies, by S. Foss and G. Last" Mathematical Reviews (1998)
- A review of "Scheduling in a multi-class series of queues with deterministic service times, by Hariharan, Moustafa and Stidham" Mathematical Reviews (1998)
- A review of "On Pathwise Analysis and Existence of Empirical Distributions for G/G/1 Queues, by F. M. Guillemin and R.R. Mazumdar" Mathematical Reviews (1997)
- A review of "A Fluid Limit Model Criterion for Instability of Multiclass Queueing Networks, by Dai, J.G.". Mathematical Reviews (1997)
- A review of " Estimation in Systems of M/G/C/C Queues, by Huang, M.L. and Brill, P.H.". Mathematical Reviews (1996)

- A review of "Queue lengths in the $GI^X/M^R/\infty$ service systems, by Liu, L. Kashyap, B.R.K. and Templeton, J.G.C.". Mathematical Reviews (1996)
- A review of "Development and Justification of the Power-Series, by Hout, W. and Blanc, H. ". Mathematical Reviews (1995)

Invited Presentations

- Waiting in Lines: a non mathematical talk USM SOUTHWORTH PLANETAR-IUM SCIENCE LECTURE SERIES. January 15, 2015.
- Statistics in Health Care. This a talk given to a group of medical Doctors and Nurses at the *Pulmonary and Critical Care center*, Central Maine Medical center, Lewiston (2008)
- Allocation of Processing Time in a Multi-Channel Load balancing Systems, USM seminar series, Spring 2007.
- Waiting in Lines Department of Mathematics and Statistics Colloquium, University of Southern Maine(2000)
- Topics in Queueing Engineering Management Program, American University of Beirut(2000)
- Filtration of ASTA: A Weak Convergence Approach", Center for Advanced Mathematical Studies, American University of Beirut (2000)
- Traffic Overflow In Loss Systems with Selective Trunk Reservation, Department of Mathematics and Statistics, University of Maine at Orono (1997)
- Fluid Versions of Little's Formula and Extensions, Department of Mathematics and Statistics and Department of Electrical Engineering, University of Massachusetts at Amherst (1996)
- Sample-Path Stability Conditions for Multiserver Input-Output Processes, Department of Operations Research, University of North Carolina, Chapel Hill (1994)
- Sample-Path Analysis of Queues, (Five lectures seminar,) Department of Operations Research, University of North Carolina, Chapel Hill (1994)
- Sample-Path Analysis of Stochastic Discrete-Event Dynamic Systems, *Systems Research Center*, University of Maryland, (1991)

- On Sample-Path Analysis of Queues, *Department of Mathematics, AT&T Bell Labs*, (1989)
- Performance Analysis of Multichannel Local Area Networks, Department of Performance Analysis, AT&T Bell Labs, (1989)

Selected Conference Presentations

- An Efficient Convolution Method to Compute the Stationary Transition Probabilities of the G/M/c Model and its Variants; The 10 IFIP/IEEE International Conference on Performance Evaluation and Modeling in Wired and Wireless Networks(PEMWN); November 23-25, 2021;Waterloo, Ontario, Canada Conference was held online.
- An Efficient Algorithm for Non-Markovian Two-Node Cyclic Network. *The Institute of Operations Research and Management Science (INFORMS) Meeting*, November 4-7, 2018, Phoenix, AZ.
- A General Workload Conservation Law with Applications to Queueing Systems. The Institute of Operations Research and Management Science (INFORMS) Meeting, November 13-16, 2016, Nashville, TN.
- Invariance of Workload in Multi-Server Systems The Institute of Operations Research and Management Science (INFORMS) Meeting, October 6-9, 2013, Minneapolis.
- Sample-Path Analysis of Queues with Batch Arrivals. The Institute of Operations Research and Management Science (INFORMS) Meeting, November 13-16, 2011, Charlotte.
- Served as Session Chair in the above conference
- Attended a day long workshop on the MINDSET Project, Charlotte NC, November 2011.
- Organizing committee of a day long summer immersion workshop for MTC. (The committee organized and led the presentations during the day)
- Attended a week-long workshop on starting a mathematics teacher's circle for middle school teachers. Funded by American Mathematical Society. Washington, DC July 25-July 29, 2010.

- "Dynamic Cruise Ship Revenue Management" The Institute of Operations Research and Management Science (INFORMS) Meeting, October 24-27, 2009, Santiago. Presentation by co-author
- Allocation of Service Time in Load Balancing stems, *The Institute of Operations Research and Management Science (INFORMS) Meeting*, November 4-7, 2006, Pittsburgh
- Machine Repair with General Repair Time and Spares, *The Institute of Operations Research and Management Science (INFORMS) Meeting*, November 4-7, 2005, San Francisco (Note: paper presented by Co-author)
- Attended First Annual Assessment Conference, SMCC, April 16,2004.
- Joint Probability Distribution of Multiple Selective Trunk Reservation Systems, The 6th World Multiconference on Systemics, Cybernetics and Informatics: Mobile/Wireless Computing and Communications Systems, July 14-18 2002, Orlando, Florida.
- Allocation of Service Time in a Multi-Server Systems, *The Institute of Operations Research and Management Science (INFORMS) Meeting*, November 4-7, 2001, Miami Beach.
- Allocation of Service Time in a Two-Server System, *The Institute of Operations Research and Management Science (INFORMS) Meeting*, May 1-4, 1999, Cincinnati.
- Fluid Versions of Little's Formula and Extensions, *The Institute of Operations Research and Management Science (INFORMS) Meeting*, April 26-29, 1998, Montreal, Canada.
- Filtration of ASTA: a Weak Convergence Approach. International Conference on Combinatorics, Information Theory and Statistics, July 18-20, 1997 (USM)
- Sample-Path Analysis of Symmetric Queues in Discrete-Time. World Congress of Nonlinear Analysts (WCNA-96), Athens, Greece (1996)
- A New Concept of Pathwise Stability Conditions for Multiserver Input-Output Processes, *INFORMS National Conference*, Los Angeles, (1995)

- Overflow Traffic in Closed Queueing Models, Fourth International Conference on Advances in *Communications and Control: Telecommunications/ Signal Processing*, Greece, (1993)
- Sample-Path Analysis of Two Symmetric Queues, *Second ORSA Telecommunications Conference*, Florida, (1992)
- Approximate Analysis of Multi-server Queueing Models with Ranked Servers, *The* 22nd Annual Pittsburgh Conference on Modeling and Simulation (1991)
- Minimum Variance Unbiased Estimation in the Truncated Gamma Distribution ORSA/ TIMS National Conference , Philadelphia, (1990)
- A Queueing Model for Multichannel Communications Networks, ORSA/TIMSNational Conference, Las Vegas, (1990)
- Time Averages and Asymptotic Distributions, ORSA/TIMS National Conference, St. Louis, (1987)

Abstracts Presented (and Published) at EULAR or ACR Conferences

-EULAR is The European League Against Rheumatism -ACR is American College of Rheumatology

- The Relationship between Erosions and Osteoporosis in Patients with Psoriatic Arthritis. by Allen Anandarajah, **Muhammad El-Taha**, Cheng Peng, George Reed, Jeffrey Greenberg and Christopher Ritchlin , 2008, Eular.
- Socioeconomic Status as a Determinant of Anti-Tumor Necrosis Factor α Therapy in Patients with Rheumatoid Arthritis in the Consortium of Rheumatology Researchers of North America (CORRONA) Database Omar Dabbous, MD, MPH; Joel Kremer, MD; Muhammad El-Taha, PhD; George Reed, PhD; Boxiong Tang, MD, PhD; Heidi Thompson, MS, MBA; Ramesh Arjunji, PhD; Mirza Rahman, MD, MPH (2006)
- Infliximab and Etanercept Switching in Patients With Psoriatic Arthritis: Findings from the Consortium of Rheumatology Researchers of North America (CORRONA) Database. Mirza Rahman, MD, MPH; Joel Kremer, MD; **Muhammad El-Taha**, PhD; George Reed, PhD; Ramesh Arjunji, PhD; Boxiong Tang, MD, PhD; Heidi Thompson, MS, MBA; Omar Dabbous, MD, MPH (2006)

- Infliximab, Etanercept, and Adalimumab Switching in Patients With Rheumatoid Arthritis in the Consortium of Rheumatology Researchers of North America (COR-RONA) Database Omar Dabbous, MD, MPH; Joel Kremer, MD; Muhammad El-Taha, PhD; George Reed, PhD; Boxiong Tang, MD, PhD; Ramesh Arjunji, PhD; Heidi Thompson, MS, MBA; Mirza Rahman, MD, MPH (ACR 2006), J.MINER. SOFTWECHS (4/2007)
- Anti-Tumor Necrosis Factor alpha Infliximab, Etanercept, and Adalimumab Switching in Patients With Psoriatic Arthritis. Findings from the Consortium of Rheumatology Researchers of North America (CORRONA) Mirza Rahman, MD, MPH; Ramesh Arjunji, PhD; Muhammad El-Taha, PhD, MPA; George Reed, PhD; Boxiong Tang, MD, PhD; Heidi Thompson, MS, MBA; Omar Dabbous, MD, MPH (2006)
- Anti-Tumor Necrosis Factor alpha Infliximab, Etanercept, and Adalimumab Switching in Patients With Rheumatoid Arthritis. Findings from the Consortium of Rheumatology Researchers of North America (CORRONA) Omar Dabbous, MD, MPH; Ramesh Arjunji, PhD; Muhammad El-Taha, PhD, MPA; George Reed, PhD; Boxiong Tang, MD, PhD; Heidi Thompson, MS, MBA; Mirza Rahman, MD, MPH (2006)

Masters Theses Supervised

- An Examination of Computational Methods Related to G/M/c Queueing (2019)
- Exploring Application of Queueing Theory to the Measurement of Biochemical Networks (2005)
- Dynamic Two-Leg Airline Seat Inventory Control with Over-booking, Cancellations, and No-Shows (2000)
- Allocation of Service Time in A Multi-server Queueing system (2000)
- Spares and Parts Inventory for Repairable-Item Systems (2000)
- Optimal Allocation of Service Time in Two-Server Systems, (1996)
- Probabilistic Analysis of Decision Trees with Medical Applications, (1995)
- Numerical Methods for the Performance Evaluation of Communication Networks with Ranked Channels, (1993)

- Stochastic Modeling and Analysis of Evolutionary Neurological Phenomena, (1992)
- Optimal Allocation of Servers in Multichannel queueing Systems with Heterogeneous Servers, (1991)
- Sample-Path Insensitivity of Some Symmetric Queues and Related Results, (1990)
- Queueing Models for the Performance Analysis of Multichannel Local Area Networks with Ranked Servers, (1990)

Professional Service

- External reviewer of a candidate for tenure at the Olayan School of Business, American University of Beirut, 2020
- External reviewer and evaluator of a candidate for promotion to Associate professor at the American University of Beirut (AUB) Lebanon, 20015.
- On the editorial board of *Queueing Models and Service Management(QMSM)*
- On the editorial board of The Open Operational Research Journal (TOORJ)
- On the editorial board of *Open Statistics and Probability Journal (TOSPJ)*
- On the editorial board of American Journal of Operations Research
- On the editorial board of Industrial Engineering and Management
- On the editorial board of International Journal of Business Analytics (IJBAN).
- External reviewer of a PhD thesis on "Performance Analysis of a Probabilistic Re-Entrant in an Environmental Stress Testing Operation" Multimedia University, (2006)
- External examiner of Masters thesis: Optimal Control of Queues-Case Illustrated-State of the Art, Cairo University (2005)
- External reviewer and evaluator of a candidate for promotion to full professor at King Saud University, Saudi Arabia, 2004.
- Member, Global organizing committee of International Federation of Nonlinear Analysts for WCNA-96 conference
- Contributed to a proposal by EPSCOR on acquiring an OC-3 link

- Referee for *Queueing Models and Service Management(QMSM)*
- Referee for Production and Operations Management
- Referee for Eurpoen Journal of Operational Research
- Referee for Annals of Operations Research
- Referee for Queueing Systems: Theory and Applications
- Referee for *Operations Research*
- Referee for *IEEE on Automatic Control*
- Referee for Computers and Operations Research
- Referee for Mathematics and Operations Research
- Referee for Journal of Applied Statistical Sciences
- Referee for Journal of Statistical Planning and Inference
- Referee for Computers and Mathematics with Applications
- Referee for *Computers and Industrial Engineering*
- Referee for Applied Mathematics and Applications
- Referee for Applied Mathematical Modeling
- Referee for Journal of King Saud University Science (JKSUS)
- Referee for The Open Operational Research Journal (TOORJ)
- Referee for Open Statistics and Probability Journal (tospj)
- Reviewer for Mathematical Reviews
- Organized and chaired a session at the second meeting for the WCNA-96 conference, July 1996, Athens, Greece
- Session Organizer: International Conference on Combinatorics, Information Theory and Statistics, July 18-20, 1997 (USM)
- Organized and chaired sessions at other national and international conferences including ORSA, INFORMS and Telecommunications

- Invited speakers from MIT, IBM, AT&T, UMO, UNC, Bowdoin College, Maine Medical center, University of Vermont, and University of Massachusetts at Amherst
- Consulting for local firms and companies

Community Service

• Founding member of the Middle Teachers Circle (*MTC*) in Southern Maine. The goals of *MTC* are to engage middle school math teachers in mathematical problem solving and involve them in an ongoing dialogue about math with students, colleagues, and professional mathematicians; to provide guidance and materials to middle school math teachers that will enable them to promote open-ended problem solving as a way of learning, thinking about, and practicing math in their classrooms; and to provide a forum to empower middle school math teachers to implement the mathematical practices in the Common Core State Standards for Mathematics.

Special Recognition Awards

- Faculty Senate Award for Excellence in Scholarship (2017), University of Southern Maine.
- Received CAS outstanding Teacher Scholar Award, 2005.
- Awarded (with S. Stidham) the "1999 Best Publication Award" by the Applied Probability section of *INFORMS* (the Institute of Operations Research and Management Science). The award recognizes the most outstanding contribution to the field of Applied Probability.
- Faculty Senate Award for Excellence in Scholarship (1999), University of Southern Maine.
- Faculty Senate Research Grant, University of Southern Maine, 1992
- Matching Fund Grant for Computer Equipment, Bath Iron Works, (1991)
- Summer Research Fellowship, University of Southern Maine, 1988
- Outstanding Teaching Assistant Award, North Carolina State University, 1986
- Omega Rho, the International Operations Research Society
- Phi Kappa Phi, honor society

Membership in Professional Societies

- Institute for Operations Research and the Management Sciences (INFORMS)
- Applied Probability Group
- *INFORMS* Telecommunications Technical Section
- World Congress of Nonlinear Analysts (WCNA)

University Service

- Member, Graduate Council, (2016-2018), (2007-2010)
- Member, CAS Graduate Affairs Committee, (2007-2010)
- Member, CAS Professional development committee (2004-2009)
- Organized a workshop on MINITAB for Full time/Part time instructors who teach MAT120, MAT211, and MAT212 to encourage the use of statistical software tools in these courses.(2004)
- Member, committee to review the Core Area D requirement, 2003-2004. This committee is charged with the review and revision of the Core Area D requirement as part of the evaluation of the university general education.
- Provost's Space Task force committee for the new wing of the science building
- Organized a workshop for high school students as part of GEAR UP summer program. June 24, 2003.
- Member, Graduate Council,
- Member, CAS Graduate Affairs Committee, 2001/2002
- Member, Core Council (Fall 2001)
- Member, Substitution and Waiver Committee (Fall 2000-2005, Fall 2010-present)
- Chair, Personnel Committee, (Fall 2000-2005, Fall 2010-present)
- Evaluation joint committee for Professor Allman who holds a joint appointment in Math/Stat and Education (2001-present)

- Designed a new brochure for undergraduate program to advertise the department curriculum.
- Redesigned the graduate program in Statistics and produced a new brochure to advertise the graduate program.
- Provided several services in my capacity as Department chair and graduate Program Director.
- Member, Graduate Committee, 9/1/1988-2000
- Chair, Equipment Committee, 9/1/1994-1999
- Coordinator, Mathematics Department Colloquium 9/1/1996-1999
- Member, Equipment Committee, 9/1/1993-5/31/1994
- Member, Faculty Senate, 1997/1998, 2013/2014 and 2014/2015
- Representative, CAS Committee on Tenure and Promotion 9/1/1993-5/31/96
- Member, Graduate Program in Statistics Evaluation Committee, 9/1/1990 5/31/1992
- Member, Graduate Program in Statistics Restructuring Committee, Spring 94
- Member, Search Committee, 9/1/1988 5/31/1989, 9/1/1995 5/31/1996
- Chair, Textbook Review Committees for several multi section courses including MAT 211, MAT 212, and MAT 120
- Member, Faculty focus group on the three semester calendar, Summer 1989
- Member, Several Masters Theses Committees

AGENDA ITEM SUMMARY

NAME OF ITEM: Proposed New Board of Trustee Policy 315 Commemorative Naming and Renaming of Academic Units and Programs

INITIATED BY: David M. MacMahon, Chair

BOARD INFORMATION:

BOARD ACTION: X

BOARD POLICY:

UNIFIED ACCREDITATION CONNECTION:

This new Board policy will provide clarity for naming and renaming of academic units and programs for consistency among all campuses.

BACKGROUND:

At the request of former Board Chair Mark Gardner, a small work group was established to develop a new Board Policy related to naming and remaining of academic units and programs. The working group was led by Board Clerk Ellen Doughty. Other members of the working group were Assistant Board Clerk Heather Massey, President and CEO of the USM Foundation Ainsley Wallace, Associate Vice Chancellor for Academic Affairs Carolyn Dorsey, UMS Director of Capital Planning and Project Management Carolyn McDonough.

The proposed new Board Policy 315 *Naming and Renaming of Academic Units and Programs* was based on Board Policy 803 *Naming of Physical Facilities* which was revised in March 2021. The working group solicited broad stakeholder input from the following areas: campus Chief Academic Officers, Faculty Representatives to the Board of Trustees, Faculty Governance Council and UMS General Counsel's office.

In August, the proposed Board Policy was reviewed by the Academic & Student Affairs (ASA) Committee and by the full Board at its September Board meeting. It is now being presented as an action item for the October ASA Committee and if approved will be presented for approval at the November Board meeting.

TEXT OF THE PROPOSED RESOLUTION:

That the Academic and Student Affairs Committee, approves the following resolution to be forwarded to the November 13-14, 2022, Board Meeting for Board of Trustee approval.

That the Board of Trustees accepts the recommendation of the Academic & Student Affairs Committee and approves the proposed new Board of Trustees Policy 315 *Naming and Renaming of Academic Units and Programs* as presented.

AGENDA ITEM SUMMARY

NAME OF ITEM: Proposed changes to Board Policy 301.3 - USM Mission

INITIATED BY: David M. MacMahon, Chair

BOARD INFORMATION:

BOARD ACTION: X

BOARD POLICY:

Board Policy 301.3: University of Southern Maine Mission

UNIFIED ACCREDITATION CONNECTION: N/A

BACKGROUND:

The University of Southern Maine proposes to update its current mission statement:

"The University of Southern Maine, northern New England's outstanding public, regional, comprehensive university, is dedicated to providing students with a high quality, accessible, affordable education. Through its undergraduate, graduate and professional programs, USM faculty members educate future leaders in the liberal arts and sciences, engineering and technology, health and social services, education, business, law and public service. Distinguished for their teaching, research, scholarly publication and creative activity, the faculty are committed to fostering a spirit of critical inquiry and civic participation. USM embraces academic freedom for students, faculty, and staff, and advocates diversity in all aspects of its campus life and academic work. It supports sustainable development, environmental stewardship, and community involvement. As a center for discovery, scholarship and creativity, USM provides resources for the state, the nation, and the world."

The proposed new mission statement is:

"Committed to equity and excellence, the University of Southern Maine advances a culture of inquiry and belonging in which research, creativity, and innovation accelerate transformational development in our students, on our campuses, and in our communities."

The proposal was reviewed at the all appropriate faculty and administrative levels at USM. Chancellor Malloy signed his approval of the proposed University of Southern Maine mission on July 27, 2022. This item was presented at the August Academic and Student Affairs (ASA) Committee meeting and the September Board of Trustees meeting as an information item and it is being presented at the October ASA Committee meeting and November Board meeting for approval.

TEXT OF PROPOSED RESOLUTION:

That the Academic and Student Affairs Committee forwards this item to the November 13-14, 2022 Board of Trustees meeting for approval of the following resolution:

That the Board of Trustees accepts the recommendation of the Academic & Student Affairs Committee and approves the changes to Board Policy 301.3 - USM Mission, as presented.

10/13/2022

AGENDA ITEM SUMMARY

NAME OF ITEM: Awarding of Academic Degrees

INITIATED BY: David M. MacMahon, Chair

BOARD INFORMATION:

BOARD ACTION: X

BOARD POLICY:

303: Academic Degrees

UNIFIED ACCREDITATION CONNECTION: None

BACKGROUND:

In accordance with Board of Trustees policy, the Board approves the awarding of academic degrees.

TEXT OF PROPOSED RESOLUTION

That the Academic and Student Affairs Committee forwards this item to the Consent Agenda at the November 13-14, 2022 Board of Trustees meeting for approval of the following resolution:

That the Board of Trustees of the University of Maine System authorize the awarding of degrees during Commencement ceremonies for the 2022-2023 academic year to those students fully recommended by the appropriate faculties and the presidents of the respective institutions of the University of Maine System.

10/13/22

AGENDA ITEM SUMMARY

NAME OF ITEM: Updated Academic and Student Affairs Work Plan. 2022-2023

INITIATED BY: David M. MacMahon

BOARD INFORMATION: X **BOARD ACTION:**

BOARD POLICY:

UNIFIED ACCREDITATION CONNECTION: None

BACKGROUND:

Annually, a work plan for the Academic and Student Affairs Committee of the Board is formulated. The work plan is intended to cover both action items required for governance of the University of Maine System and those topics of import and interest to the Board. This work plan is a "living document" and has been updated based on feedback from Trustees. Other topics will be added as needed or required for decision making. The Work Plan will be updated as the Faculty and Student Representatives present their individual items. Items in red are action items. Rosa Redonnett, Associate Vice Chancellor for Student Success and Credential Attainment, will review the updated plan with the Committee.

AGENDA ITEM SUMMARY

NAME OF ITEM: Update - NECHE

INITIATED BY: David M. MacMahon, Chair

BOARD INFORMATION: X

BOARD ACTION:

BOARD POLICY:

N/A

UNIFIED ACCREDITATION CONNECTION:

N/A

BACKGROUND:

Associate Vice Chancellor for Accreditation and Strategic Initiatives Jeffrey St. John will give an overview of the October 1-4, 2022 New England Commission on Higher Education (NECHE) accreditation visit.

NECHE Exit Report

October 12, 2022

Below is a summary of the October 5, 2022 Exit Report delivered by evaluation team chair Ross Gittell as compiled from notes taken by multiple System staff. Links to NECHE's *Standards for Accreditation* are provided for reference.

Introduction

Today's report is an oral summary of strengths and concerns and is consistent with the list the team will include in [its final] report. It is a candid review of strengths and areas where the team finds a need for further attention. We appreciate the progress that has been made and hope this report guides further [UMS] action.

Strengths

Standard 1: Mission and Purposes

- 1. Leadership teams, faculty, and staff demonstrate a strong commitment to the mission of unified accreditation.
- 2. The unified UMS mission provides a strong case for funded support. Major funding sources [e.g. the Alfond Foundation] illustrate significant progress [in this regard].

Standard 2: Planning and Evaluation

- 1. Unified accreditation reflects innovative thinking and planning to address the changing environment of higher education while also serving local communities.
- 2. In their planning processes, the universities and System have cultivated an environment of collaboration and a reduction of competition.
- 3. UMS demonstrates a commitment to serving the people and students of Maine, especially in the more rural areas of the state.

Standard 3: Organization and Governance

- 1. There is System-wide belief in the potential of unified accreditation to address problems for students and the state, and dedication to [demonstrating] how a unified focus can further the UMS mission.
- 2. The Board of Trustees believes in the potential of unified accreditation to fulfill the UMS mission.
- 3. System staff are dedicated to tackling unified accreditation on behalf of students at all of the universities.

Standard 4: The Academic Program

1. The University of Maine's research program and Carnegie R1 status benefit all UMS universities.

- 2. Every UMS distance and online student can access [academic support] services, coaches, advising, and career services.
- 3. Unified accreditation provides tools that expand the development and sharing of courses and programs across the System and thereby broaden access.

Standard 5: Students

1. Staff at each university and the System are dedicated to the success of students and the specific populations they serve. This is evident in their response to student needs and in their engagement of students.

Standard 6: Teaching, Learning, and Scholarship

No strengths were noted about Standard 6.*

Standard 7: Institutional Resources

1. The consolidation of shared services began before unified accreditation; is well-postured; and shows hallmarks of a mature model. UMS's shared services teams show a desire for continuous improvement and collaboration.

Standard 8: Educational Effectiveness

1. Unified accreditation provides a platform and support for educational effectiveness [i.e. academic assessment] that can cross to other standards. UMS TRANSFORMS is an example of this kind of cross-standard work.

Standard 9: Integrity, Transparency, and Public Disclosure

1. Infrastructure and processes are in place to develop and make publicly available key policies; these processes both reflect and seek the perspectives of stakeholders.

*Note from Jeff St. John: Evaluation teams are not required to identify strengths and concerns for every Standard. There is nothing negative or unusual about an absence of strengths/concerns in a given area of a team's report.

Concerns

Standard 1: Mission and Purposes

No concerns were noted about Standard 1.

Standard 2: Planning and Evaluation

10.1

- 1. The absence of a [current] System-wide strategic plan has delayed progress. Without a plan and clear identification of goals, priorities, metrics, and timelines, it is hard to move forward in a timely and coherent way.
- 2. There is too high of a reliance on external consultants/vendors for UMS initiatives like the development of the strategic plan. This is incongruent with the voiced public urgency for [implementing] unified accreditation.

Standard 3: Organization and Governance

- 1. There is a need for greater clarity on roles, responsibilities, and decision authority.
- 2. While collaboration is encouraged, current metrics continue to foster competition among [various university units].
- 3. The faculty role in governance [via the UMS Faculty Governance Council] is identified as an area of concern deterring progress. [The Council] needs to engage faculty and develop a charter that is clear and agreed upon.

Standard 4: The Academic Program

No concerns were noted about Standard 4.

Standard 5: Students

- 1. Identification and support of student needs remains strong at the university level, but is less organized at the System level. Action is needed to develop more System-level support to help students take advantage of resources and courses System-wide.
- 2. Each university serves different populations. Responses to unique needs are organized by university and need to retain some of that customization.
- 3. Analysis of retention and completion [data] will provide a clearer understanding of the role of each university, and how the System can support the universities' efforts to reach unique populations. Consideration should be given as to how to set metrics by population groups as opposed to solely at the university level.

Standard 6: Teaching, Learning, and Scholarship

No concerns were noted about Standard 6.

Standard 7: Institutional Resources

- 1. Unified accreditation offers significant value through the sharing of resources. Stronger System-led processes are needed to realize unified accreditation's promise.
- 2. The Repaving MaineStreet project shows promise. However, it is difficult to track its progress due to a lack of ownership. The project needs clarity and communication about goals, objectives, and timelines. This is critical. A strong project management approach is needed.

Standard 8: Educational Effectiveness
1. In addition to university-based assessment, System-wide assessment requires further development.

Standard 9: Integrity, Transparency, and Public Disclosure

No concerns were noted about Standard 9.

Conclusion

In conclusion, we extend our appreciation for your help and hospitality. Through this process, we have identified many strengths and [areas where] progress [has been] made. We hope our identification of strengths and challenges will be helpful as you move forward on this important and difficult work.

End of Exit Report

Next steps and timeline

- Approx. November 16: UMS receives the evaluation team's draft report and responds with corrections for factual accuracy (only).
- Approx. December 7: The team's final report is shared with NECHE and UMS, and the team chair's confidential recommendation is shared with NECHE (only). The confidential recommendation is a standard component of the evaluation process.
- Approx. mid-December: NECHE invites UMS to respond on substantive grounds to the team's report. Our response should be no more than 5-6 pages in length and may include updates on our progress in addressing concerns cited by the team. We are also free to address any differences of interpretation we have with the team's assessments.
- March or April 2023: Chancellor Malloy and President Gittell meet with the full NECHE Commission in Massachusetts. Collectively, they discuss the self study, the team report, our response to the report, and questions and observations from Commission members.
- Approx. May/June 2023: The Commission sends Chancellor Malloy and Chair Riley a letter detailing its findings and providing guidance for future UMS action.

AGENDA ITEM SUMMARY

NAME OF ITEM: Academic Year Calendar AY 2027-2028 and AY 2028-2029

INITIATED BY: David M. MacMahon, Chair

BOARD INFORMATION: X

BOARD ACTION:

BOARD POLICY: 302: Academic Calendars APL X-C Common Academic Calendar

UNIFIED ACCREDITATION CONNECTION:

BACKGROUND:

The Academic Calendar was typically updated every three years. To enable campus Academic and Service departments to plan more effectively, the Registrars/Student Records Directors proposed to the Chief Academic Officer Council (CAOC) that beginning with the AY 2021-2022 calendar forward, two years would be presented on an annual basis (as opposed to waiting three years). The AY 2027-2028 and AY 2028-2029 calendars are attached.

The guidance provided campuses as preparation of the calendars can be found here: <u>https://www.maine.edu/students/office-of-the-vice-chancellor-of-academic-affairs/apl-x-c/</u>

University of Maine System 2027 – 2028 Academic Calendar – DRAFT

Fall Semester 2027

								UM Law
Event	UM	UMA	UMF	UMFK	UMM	UMPI	USM	School
Orientation								Aug 2
Classes Begin	Aug 30							
Labor Day								
Holiday	Sep 6							
Fall Break	Oct 11-	Oct 11						
	12	12	12	12	12	12	12	
Veterans Day								
Holiday	Nov 11							
Thanksgiving	Nov	Nov	Nov 24-	Nov 24-	Nov 24-	Nov 24-	Nov	Nov 24-
Recess	24-28	24-28	28	28	28	28	24-28	28
Classes End	Dec 10	Dec 3						
Final Exams	Dec	Dec	Dec 13-	Dec 13-	Dec 13-	Dec 13-	Dec	Dec 9 –
	13-17	13-17	16	16	17	16	11-17	21
Degree Conferral	Dec 17	Dec 17	Dec 16	Dec 16	Dec 17	Dec 16	Dec 17	Dec 21

Winter Session 2027/2028

Event	UM	UMA	UMF	UMFK	UMM	UMPI	USM	UM Law School
Classes Begin	Dec 27	Dec 20						
Classes End	Jan 14							

Spring Semester 2028

Event	UM	UMA	UMF	UMFK	UMM	UMPI	USM	UM Law School
Orientation								
Classes Begin	Jan 18	Jan 18						
Presidents' Day	Feb 21	Feb 21						
Holiday								
Spring Break	Mar 13-	Mar 13-						
	19	19	19	19	19	19	19	19
Classes End	Apr 28	Apr 25						
							Apr 29 -	May 1-
Final Exams	May 1-5	May 1-5	May 1-4	May 1-4	May 1-5	May 1-4	May 5	11
Degree Conferral	May 5	May 5	May 4	May 4	May 5	May 4	May 5	May 11
Commencement	May 6	May 6	May 6	May 6	May 5	May 6	May 6	May 20

Summer Term 2028:

								UM Law
Event	UM	UMA	UMF	UMFK	UMM	UMPI	USM	School
Classes Begin	May 8	May 15	May 22					
Classes End	Aug 18	Jul 20						
Degree Conferral	Aug 18	Jul 20						

11.1

The following holidays are observed during Summer Term:

- Memorial Day
- Juneteenth
- Independence Day

Each Semester has the minimum of 68 class days not counting finals.

Short Session Courses

With the exception of national holidays, any additional breaks or holiday observances will be at the discretion of the instructor.

Religious and Cultural Observances

Our faculty, staff, and students are from varied religious and cultural backgrounds which serve to enrich and strengthen our community. Any event scheduled on a major religious or cultural holiday can send a message of insensitivity or exclusivity to staff and students who cannot participate that day due to their religious beliefs. Therefore, please avoid scheduling important meetings, exams, or other essential events on such dates whenever possible to accommodate the observance of religious traditions for those staff and students who need to be absent for religious holidays throughout the year. Some information about major religious holidays may be found at the <u>University of Maine System Human Resources page</u>. An extensive listing is online at the <u>Interfaith Calendar website (External Site)</u>.

University of Maine System 2028 – 2029 Academic Calendar – DRAFT

Fall Semester 2028

								UM Law
Event	UM	UMA	UMF	UMFK	UMM	UMPI	USM	School
Orientation								Aug 23-25
Classes Begin	Aug 28	Aug 28	Aug 28	Aug 28	Aug 28	Aug 28	Aug 28	Aug 28
Labor Day Holiday	Sep 4	Sep 4	Sep 4	Sep 4	Sep 4	Sep 4	Sep 4	Sep 4
Fall Break	Oct 9-	Oct 9-	Oct 9-	Oct 9-10	Oct 9-	Oct 9-	Oct 9-	Oct 9
	10	10	10		10	10	10	
Veterans Day	Nov	Nov	Nov 10	Nov 10	Nov 10	Nov 10	Nov 10	Nov 10
Holiday (observed)	10	10						
Thanksgiving	Nov	Nov	Nov	Nov 22-	Nov 22-	Nov 22-	Nov	Nov 22-26
Recess	22-26	22-26	22-26	26	26	26	22-26	
Classes End	Dec 8	Dec 8	Dec 8	Dec 8	Dec 8	Dec 8	Dec 8	Dec 1
Final Exams	Dec	Dec	Dec	Dec 11-	Dec 11-	Dec 11-	Dec 9-	Dec 7-19
	11-15	11-15	11-14	14	15	14	15	
Degree Conferral	Dec	Dec	Dec 14	Dec 14	Dec 15	Dec 14	Dec 15	Dec 19
	15	15						

Winter Session 2028/2029

Event	UM	UMA	UMF	UMF K	UMM	UMPI	USM	UM Law School
Classes Begin	Dec	Dec 26	Dec 26	Dec 26	Dec 26	Dec 26	Dec 18	
	26							
Classes End	Jan 12	Jan 12	Jan 12	Jan 12	Jan 12	Jan 12	Jan 12	

Spring Semester 2029

Event	UM	UMA	UMF	UMFK	UMM	UMPI	USM	UM Law School
Orientation								
Classes Begin	Jan 16							
Presidents' Day	Feb 19							
Holiday								
Spring Break	Mar	Mar 12-	Mar	Mar 12-				
	12-18	18	12-18	18	18	18	18	18
Classes End	Apr 27	Apr 24						
Final Exams	Apr 30-	Apr 28-	Apr 30-					
	May 4	May 4	May 3	May 3	May 4	May 3	May 4	May 10
Degree Conferral	May 4	May 4	May 3	May 3	May 4	May 3	May 4	May 10
Commencement	May 5	May 5	May 5	May 5	May 4	May 5	May 5	May 19

Summer Term 2029:

Event	UM	UMA	UMF	UMFK	UMM	UMPI	USM	UM Law School
Classes Begin	May 7	May 14	May 21					
Classes End	Aug 18	Jul 19						

11.2

The following holidays are observed during Summer Term:

- Memorial Day
- Juneteenth
- Independence Day

Each Semester has the minimum of 68 class days not counting finals.

Short Session Courses

With the exception of national holidays, any additional breaks or holiday observances will be at the discretion of the instructor.

Religious and Cultural Observances

Our faculty, staff, and students are from varied religious and cultural backgrounds which serve to enrich and strengthen our community. Any event scheduled on a major religious or cultural holiday can send a message of insensitivity or exclusivity to staff and students who cannot participate that day due to their religious beliefs. Therefore, please avoid scheduling important meetings, exams, or other essential events on such dates whenever possible to accommodate the observance of religious traditions for those staff and students who need to be absent for religious holidays throughout the year. Some information about major religious holidays may be found at the <u>University of Maine System Human Resources page</u>. An extensive listing is online at the <u>Interfaith Calendar website (External Site)</u>.

AGENDA ITEM SUMMARY

NAME OF ITEM: Enrollment Update

INITIATED BY: David M. MacMahon, Chair

BOARD INFORMATION: X

BOARD ACTION:

BOARD POLICY:

UNIFIED ACCREDITATION CONNECTION: N/A

BACKGROUND:

Dr. Robert Placido will provide a brief update on the Fall 2022 UMS enrollments.

AGENDA ITEM SUMMARY

NAME OF ITEM: Tenure Request, Professor in the College of Education and Human Development, UM

INITIATED BY: David M. MacMahon, Chair

BOARD INFORMATION:

BOARD ACTION: X

BOARD POLICY:

Board Policy 310: Tenure

UNIFIED ACCREDITATION CONNECTION:

N/A

BACKGROUND:

The University of Maine has requested that Dr. Ezekiel Kimball be awarded tenure at the rank of Professor in the School of Educational Leadership, Higher Education, and Human Development, UM, effective July 1, 2022. This appointment coincides with Dr. Kimball's appointment as Associate Dean for Undergraduate and Teacher Education in the College of Education and Human Development at the University of Maine. Dr. Kimball was selected after an extensive search and rigorous evaluation process. Dr. Kimball's credentials have been reviewed by the faculty and staff of the School of Educational Leadership, Higher Education, and Human Development and have received their full support.

TEXT OF PROPOSED RESOLUTION:

That the Academic and Student Affairs Committee forwards this item to the November 13-14, 2022 Board of Trustees meeting for approval of the following resolution:

That the Board of Trustees accepts the recommendation of the Academic & Student Affairs Committee and approves tenure at time of hire, Professor in the College of Education and Human Development with tenure to be effective July 1, 2022.

AGENDA ITEM SUMMARY

NAME OF ITEM: Tenure Request, Professor in the College of Engineering, UM

INITIATED BY: David M. MacMahon, Chair

BOARD INFORMATION:

BOARD ACTION: X

BOARD POLICY:

Board Policy 310: Tenure

UNIFIED ACCREDITATION CONNECTION:

N/A

BACKGROUND:

The University of Maine has requested that Dr. Giovanni Guidoboni be awarded tenure at the rank of Professor in the department of Electrical and Computer Engineering, effective January 16, 2023. Dr. Guidoboni was selected after an extensive search and rigorous evaluation process. Dr. Guidoboni's credentials have been reviewed by the faculty and staff of the Department of Electrical and Computer Engineering and have received their full support.

TEXT OF PROPOSED RESOLUTION:

That the Academic and Student Affairs Committee forwards this item to the November 13-14, 2022 Board of Trustees meeting for approval of the following resolution:

That the Board of Trustees accepts the recommendation of the Academic & Student Affairs Committee and approves tenure at time of hire, Professor in the College of Engineering with tenure to be effective January 16, 2023.

AGENDA ITEM SUMMARY

NAME OF ITEM: Tenure Request, Professor in the College of Management and Human Service (USM)

INITIATED BY: David M. MacMahon, Chair

BOARD INFORMATION:

BOARD ACTION: X

BOARD POLICY:

Board Policy 310: Tenure

UNIFIED ACCREDITATION CONNECTION:

N/A

BACKGROUND:

The University of Maine has requested that Dr. Daniel Wong be awarded tenure at the rank of Professor in the Department of Counselor Education, effective January 1, 2023. Dr. Wong was selected after an extensive search and rigorous evaluation process. Dr. Wong's credentials have been reviewed by the faculty and staff of the Department of Counselor Education and have received their full support.

TEXT OF PROPOSED RESOLUTION:

That the Academic and Student Affairs Committee forwards this item to the November 13-14, 2022 Board of Trustees meeting for approval of the following resolution:

That the Board of Trustees accepts the recommendation of the Academic & Student Affairs Committee and approves tenure at time of hire, Professor in the College of Management and Human Service with tenure to be effective January 1, 2023.