Engineering education at a crossroad

With thoughts on their alignment with BCOE

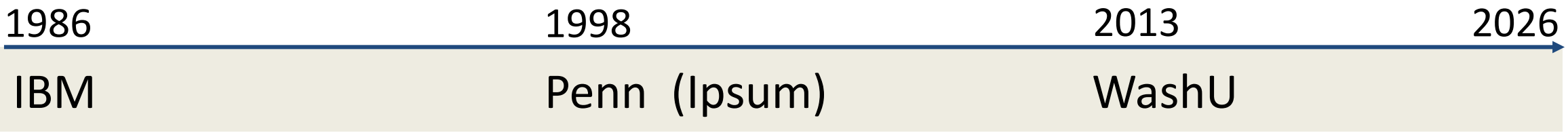
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PRESENTATION TO

University of California Riverside

Experience spanning research, education, and practice



Academic & industry leadership

Research manager at IBM and department chair in CSE at WashU, where I have helped launch multiple graduate and undergraduate programs.

Research and innovation

Career in networking, distributed systems, and technology adoption. Co-founder, CEO, and Chief Scientist at Ipsum Networks.

Service

Leadership roles with ACM, IEEE, NSF, university committees, and external academic review.

Most importantly I have been fortunate to have worked with many incredibly talented people and to have been at the right place at the right time a few times

I also have experience in managing during periods of growth, decline, and crisis

Overview

The 2026 Academic “Adjustment”

AI & Skill Disruption

55% of US faculty report deep concern over student intellectual skill erosion due to unguided generative tools.

Enrollment Drops

13% projected contraction in traditional 18-year-old college cohort alongside shifting visa policies.

Compute & Lab Gap

Industry AI labs outpace university compute capacity by 100x, threatening academic scientific independence.

Financial Uncertainty

Evolving funding landscape coupled with political tensions that challenge traditional recruiting and revenue pipelines.

Implications: Academic institutions must engage in broad-based transformations while facing significant uncertainty regarding how to secure the necessary resources

Cornell University's Committee on the Future of the American University (FAU), “Report of the Committee on the Future of the American University.” September 22, 2026. See also “Five Commitments to Renew the American University”.

Challenges - Educational Domain

Pedagogical Shift & Student Preparedness

1. AI-Driven Skill Redefinition

Rapid automation of entry-level tasks raises the bar; critical evaluation and prompt quality now dictate outcome success.

2. Educator Professional Development

67% of faculty feel unprepared to adapt course designs for agentic AI tools without centralized campus training.

3. COVID Trailing Gaps & Equity

Post-COVID foundational gaps hit under-resourced students hardest; AI tools risk widening learning disparities without guided tutoring.

4. Need for lifelong learning and upskilling

Professional from all levels and fields need to develop proficiency in the use of agentic AI tools; universities need to meet this demand.

Challenges - Research Domain

Research Pipeline & Resources Pressures

1. Problem Formulation & Solution Challenges

Learning curve gates access to new AI tools. Over-reliance on them risks eroding early-stage problem conceptualization and framing.

2. Compute Deficit

AI subsidies won't last. Academic labs face increasing costs for access to AI tools or GPUs, risking research marginalization vs. industrial labs.

3. Talent Bottlenecks

Shifting federal visa regulations dampen international PhD recruitment, necessitating stronger domestic feeder pipelines.

4. The Risk of Too Much AI

AI is transformative and cannot be ignored, but there such a thing as too much AI if it comes at the cost of ignoring other areas

Challenges - Financial & Operational Domain

A multi-pronged “attack surface”

1. Decreases in traditional revenue sources

Demographic cliff’s impact on long-term enrollments. Drop in international Master students from political and immigration uncertainty. Changes to financial models (indirect cost rate, endowment tax, etc.).

2. Impact of funding uncertainty

Evolving federal and state landscape with shifting priorities affect both current and future research (academia as a less attractive career path)

3. Increases in operational costs

Growth in operational expenditures, *e.g.,* cybersecurity insurance, upgrades to backend systems, etc., as well as moving target of access to AI tools.

4. Questioning of the university value proposition

Impact of AI on “knowledge jobs”. Increasing affordability gap. Growth in non-degree alternatives.

Why BCOE, why now?

Today's great challenges are also associated with equally great opportunities

- We are facing a period of transition where academia needs to define what to do next
- The rapid rise of AI, if properly harnessed, can be transformative in both education and research

BCOE's mission to educate a diverse student population and its emphasis on hands-on learning resonates with me

- The college can help realize making learning tangible in an AI-shaped world
- UCR's diversity offers opportunity for world class interdisciplinary research that will only grow in importance

Throughout my career, my heart was in research, but

- I believe I can now have a bigger impact applying my experience leading and growing programs and connecting engineering to practice in helping a college like BCOE navigate this transition
- What follows though is necessarily provisional. It reflects initial directions I have identified and attempts to map them to BCOE and UCR initiatives I was able to identify. If selected, I would begin by learning from faculty, staff, students, alumni, industry partners, and campus colleagues.

Opportunities - Education

Modernizing Curriculum & Pedagogy

1. Reassess curriculum in light of AI's emergence

Have department carry out strategic curriculum audits to align learning outcomes with agentic workflow reality: What to learn, why, and how?

2. Experiential Anchors

Leverage real-world problem-solving anchors in courses and embed research experience with solutions that go beyond simple prompting. Promote outcomes involving tangible physical artifacts.

3. Faculty support

Offer free modular workshops on use of AI tool, and provide some level of instructional release time for curriculum updates. Facilitate cross-departmental development of X+AI courses.

4. Student support

Explore access to institutionally hosted AI tutors to bridge learning gaps while preserving learning objectives and safeguarding student privacy.

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UCR LAUNCH initiative*

Help students understand how AI works, recognize its limitations, and learn to use it productively in their academic work without taking shortcuts that prevent them from learning the foundational concepts and skills they need to master their chosen fields.

Faculty members and other college instructors across academic disciplines will be trained to incorporate AI effectively into their courses. They will attend summer workshops and receive stipends to develop courses that teach students how to use AI in their fields.

Establish an on-campus hub where students can receive assistance from undergraduate learning assistants and participate in AI-related projects developed with community and industry partners.

UCR AIM initiative*

Modernize engineering education by working with companies to identify the skills they need in future employees and incorporating those requirements into university coursework.

Learn to work across engineering disciplines and collaborate with increasingly sophisticated robotic systems, including determining when to rely on AI-generated decisions and when human intervention is necessary.

* https://news.ucr.edu/articles/2026/10/19/ucr-receives-8-million-federal-grants

Opportunities - Research

Research Infrastructure & Pipeline Building

1. Interdisciplinary Seed Grants

Establish internal seed funding targeted at high-impact "Grand Challenges" requiring cross-college collaboration.

2. Facilitate AI Adoption

AI are powerful new tools, but mastering them takes time and efforts. Encourage and foster information sharing and cross-training through community workshops and area-focused events.

3. In-House Open Model Capabilities

Invest in centralized compute hardware and open-weights LLMs to provide secure data environments for faculty research beyond access to commercial tools and cloud compute resources.

4. Domestic Pipeline & Feeder Networks

Expand undergraduate research initiatives and forge regional institution partnerships to secure graduate talent.

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5. Continue Investing in “Strategic” Areas

AI is important and a new tool we cannot ignore, but it is essential to continue to nurture broad-based exploration

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UCR's Chancellor's Interdisciplinary Seed Grant Program*

This program is specifically intended to build interdisciplinary teams capable of securing transformational large external awards and establishing long-term research leadership in areas of strategic importance for UC Riverside.

UCR AI Community of Practice for Research**

How are you using AI for writing, coding, data analysis, grant proposals, and other research activities? What questions and challenges are you encountering?

The UCR AI Community of Practice for Research is a new Fall 2026 initiative for researchers to share experiences, practical tips, and questions about using AI in research. Join us for our kickoff meeting!

UCR Ursa Major + HPCC clusters***

Ursa Major for deployment of lab compute clusters in Google Cloud. HPCC cluster for batch jobs

* https://research.ucr.edu/funding ** https://events.ucr.edu/event/ucr-ai-community-of-practice *** https://ucr-research-computing.github.io/

Opportunities - Financial & Operational

Financial Resiliency & Revenue Diversification

1. Masters Programs Expansion

Continue growing 4+1 and 3+2 programs by highlighting value proposition
Develop new Master's degrees in areas connected to high industry demand
Subsidize pathways into doctoral programs for qualified candidates

2. Professional Micro-Credentials

Leverage existing course content and demand for AI upskilling to develop stackable certificates in AI applications

3. Expand Industry Partnerships

Identify and develop opportunities across multiple time-scales by combining educational and research collaboration opportunities.
Strengthen recruiting pipeline towards building long-term connections

4. Strategic Alumni Development

Leverage alumni network with broad-based outreach in support of student fellowship funds while highlighting faculty accomplishments.

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BCOE Accelerated Master's Program*

Earn a master's degree in as little as one additional academic year.
The B.S. + M.S. Program lets eligible students apply approved coursework toward both degrees.

UCR micro-credentials and professional certificates**,***

Build on existing UCR framework for micro-credentials that is based on "short, focused learning experience that develops a specific skill or competency that is valued by employers," and possibly expand professional certificates to hybrid offerings.

BCOE Research Consortia (CE-CERT)† and UCR SoCal OASIS Park‡

BCOE consortia create spaces where partners can share technical challenges, evaluate emerging technologies and collaborate with experts across transportation, energy, emissions and environmental systems.
Center for research in climate change, air quality and mobility aimed at preparing the next generation of the Clean Tech workforce for Riverside and the Inland Empire.

* https://engr.ucr.edu/admissions/bachelors-masters-program ** https://provost.ucr.edu/micro-credentials *** https://extension.ucr.edu/internationaleducationprograms/programpages/professionalcertificates
† https://engr.ucr.edu/research-partnerships ‡ https://pdc.ucr.edu/oasis-park

A vision should, however, begin with listening

A dean can offer directions and support, but the BCOE community must shape the work

My current view is necessarily provisional. It reflects my perception of the challenges ahead and attempts to map them to what I have learned about BCOE and UCR. If selected, I would begin by learning from faculty, staff, students, alumni, industry partners, and campus colleagues & administration.

The aim is shared ownership and responsibility: A vision must be grounded in existing strengths and informed by evidence, but it can only be realized and sustained by the people responsible for bringing it to life.

Thank You

I'll be happy to take questions

Sources

1. AI Integration, Skills Shift, and Student Engagement

- **Pew Research Center (2025/2026 Reports on AI in the Workforce & Education):**
  - Report: *About 1 in 5 U.S. Workers Now Use AI in Their Job / Pew Research Workforce Analysis*
  - Full PDF Report: *Pew Research Center Report on AI and Job Skills*
- **OECD – Artificial Intelligence and the Future of Skills:**
  - Report: *OECD AI and the Future of Skills Assessment Framework*
- **EDUCAUSE – Teaching and Learning Trends & Horizon Reports:**
  - Resource Portal: *EDUCAUSE Horizon Report Series*
- **MIT's Ad Hoc Committee on AI Use in Teaching, Learning, and Research Training**
  - Report: https://aiandeducation.mit.edu/report/, August 13, 2026
- **Cornell University, The Future of the American University, September 22, 2026**
  - Vision statement: Five Commitments to Renew the American University: A Vision Statement
  - Report: Report of the Committee on the Future of the American University
- **NSF LEVEL UP AI Workshop Recommendations,** *"AI Integration in Interdisciplinary Academic Programs."* July 2026

2. COVID-19 Trailing Learning Gaps & Post-Secondary Preparedness

- **National Center for Education Statistics (NCES) / NAEP (The Nation's Report Card):**
  - Assessment Data: *NCES NAEP Long-Term Mathematics & Reading Results*
  - Analysis: *Education Week Report on Grade 12 NAEP Results and College Readiness Gaps*
- **Cato Institute Policy Analysis on High School Academic Preparedness:**
  - Post-COVID Trends: *Cato Institute Analysis on NAEP Grade 12 Results*

3. International Recruitment and Federal Visa Volatility

- **Institute of International Education (IIE) – Open Doors Report:**
  - Press Release & Key Findings: *IIE Open Doors International Student Enrollment Release*
  - Historical Data Tables: *IIE Open Doors Enrollment Trends Portal*
- **EducationUSA (U.S. Department of State):**
  - Institutional Recruitment Data: *EducationUSA Open Doors Report Overview*

4. Academic vs. Industry Compute Disparity & Research Infrastructure

- **National AI Research Resource (NAIRR) Pilot – U.S. National Science Foundation (NSF):**
  - Main Portal: *NSF National Artificial Intelligence Research Resource (NAIRR) Portal*
  - Pilot Funding Call: *NSF Dear Colleague Letter on NAIRR Compute and Dataset Access*
- **Stanford Institute for Human-Centered AI (HAI):**
  - AI Index Portal: *Stanford HAI AI Index Report*

5. Value Proposition, Public Trust, and Demographic Pressures

- **Gallup & Lumina Foundation Surveys on Higher Education:**
  - Public Confidence Survey: *Gallup News: Confidence in U.S. Higher Education*
  - Gallup Topic Hub: *Gallup & Lumina Foundation Higher Education Studies*
- **Higher Education Sector Financial Pressures & Budget Adaptation:**
  - Campus Financial Trends Analysis: *UO Analysis on Higher Ed Cost-Cutting Programs and Structural Deficits*