EXECUTIVE SUMMARY: COMPUTATIONAL MATH REFORM FOR OREGON

Objective: To modernize Oregon's higher education math curriculum by implementing computational mathematics, improving STEM retention, and increasing economic output, while positioning the state as a foundational leader in global STEM accessibility and cognitive diversity. This initiative reaffirms Oregon's legacy as a state of progressive reformists and pioneers in pilot programs that drive national and global change.

THE PROBLEM: HIGH STEM ATTRITION IS COSTING OREGON BILLIONS

Each year, nearly **4,774 STEM students in Oregon drop out or switch majors**, leading to **massive economic losses**:

- **Lost Tuition Revenue:** $143M
- **Lost Workforce Earnings:** $310M
- **Lost State Tax Revenue:** $21.7M
- **Total Annual Economic Loss: $475M**

With only **45% of STEM freshmen completing their degrees**, Oregon faces an unsustainable talent drain. STEM graduates earn **higher wages, contribute more taxes, and drive tech innovation**, yet more than half never complete their degrees due to outdated curricula that fail to prepare them for real-world problem-solving.

Beyond state-level economic consequences, this issue contributes to the **global crisis in STEM workforce shortages**, limiting humanity's ability to develop sustainable solutions to existential threats such as climate change, resource depletion, and technological disruption. Oregon has the opportunity to lead a paradigm shift in math education that could influence national and international education policy.

THE SOLUTION: IMPLEMENT COMPUTATIONAL MATH ACROSS STATE COLLEGES

Shifting to **computational mathematics** will: ✅ **Reduce STEM dropout rates** by making math more accessible and industry-relevant.

✅ **Prepare students for real-world STEM careers** that rely on technology-driven problem-solving.

✅ **Increase Oregon's tech workforce, tax revenues, and job competitiveness.**

✅ **Expand access to STEM careers for a cognitively diverse student body, fueling**

broader innovation and inclusive problem-solving.

✅ **Solidify Oregon's reputation as a leader in progressive education reform.**

COST-BENEFIT ANALYSIS

Investment: $18M One-Time Implementation Cost

- **Faculty Training:** $5M
- **Software & Licensing:** $3M
- **Curriculum Development:** $2.5M
- **Infrastructure Upgrades:** $4M
- **Student Support & Tutoring:** $2M

Projected Annual Revenue Gains

A **small increase in STEM retention** unlocks massive economic gains:

- **5% STEM Retention Increase → $23.7M recovered annually**
- **10% STEM Retention Increase → $47.5M recovered annually**
- **15% STEM Retention Increase → $71.3M recovered annually**

✅ **Break-even achieved within 1 year at 10% retention gain.**

✅ **By Year 5, Oregon gains ~$190M in net-positive returns.**

WHY THIS REFORM MAKES SENSE

✓ **Financially Responsible:** The investment pays for itself within 1-2 years.

✓ **Workforce-Aligned:** Meets employer demand for computationally skilled graduates.

✓ **Scalable & Replicable:** Puts Oregon at the forefront of national and global math education reform.

✓ **Supports Global STEM Readiness:** Expanding access to computational literacy enhances global problem-solving capacity, ensuring that STEM solutions to crises are driven by a wider, more diverse range of human perspectives.

✓ **Strengthens Oregon's Position as an Innovation Hub:** By implementing this reform, Oregon further establishes itself as a progressive force in national and global education policy.

CALL TO ACTION

Pass HB3182 & HB3183 with a directive to integrate **computational mathematics in all Oregon state-funded colleges** and establish a **pilot program to track student outcomes and retention improvements.**

🚀 **By making STEM education more accessible, Oregon can lead a global shift toward cognitive diversity in problem-solving, ensuring humanity's survival through sustainable innovation while reaffirming its reputation as a state that drives meaningful, forward-thinking educational reform.**

SOURCE & METHODOLOGY DOCUMENT: COMPUTATIONAL MATH REFORM ANALYSIS

Objective: This document outlines the data sources, assumptions, and algorithms used to generate the economic impact estimates for Oregon's computational math reform proposal.

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1. Data Sources

Public & Government Data:

- **Oregon High School Graduation & College Enrollment Rates**
    - Source: National Center for Education Statistics (NCES) & Oregon Higher Education Coordinating Commission (HECC)
    - **62% of high school graduates enroll in college** (Oregon public & private institutions)
- **National STEM Enrollment & Graduation Benchmarks**
    - Source: U.S. Department of Education & National Science Foundation (NSF) STEM Trends Report
    - **35% of incoming college freshmen declare STEM majors**
    - **45% of declared STEM students graduate with a STEM degree**
- **Oregon Economic & Workforce Data**
    - Source: Oregon Office of Economic Analysis (OEA) & Bureau of Labor Statistics (BLS)
    - **STEM graduate average starting salary: $65,000**
    - **Effective state tax rate: 7%**
- **State Funding & Higher Education Financial Reports**
    - Source: Oregon HECC & Oregon University System
    - **Average annual tuition: $10,000** (public in-state institutions)
    - **Typical dropout period before switching or leaving: 3 years**

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2. Algorithmic Methodology

Step 1: Estimate STEM Enrollment & Dropout Figures

$$\text{STEM}_{\text{Freshmen}} = \text{HS}_{\text{Graduates}} \times \text{Enrollment}_{\text{Rate}} \times \text{STEM}_{\text{DeclarationRate}}$$
$$\text{STEM}_{\text{Graduates}} = \text{STEM}_{\text{Freshmen}} \times \text{STEM}_{\text{GradRate}}$$
$$\text{STEM}_{\text{Dropout}} = \text{STEM}_{\text{Freshmen}} - \text{STEM}_{\text{Graduates}}$$

Values Used:

- HS Graduates: **40,000** (annual estimate for Oregon)
- College Enrollment Rate: **62%**
- STEM Declaration Rate: **35%**
- STEM Graduation Rate: **45%**

- **Results:**
  - **STEM Freshmen: 8,680**
  - **STEM Graduates: 3,906**
  - **STEM Dropout/Attrition: 4,774**

Step 2: Estimate Economic Loss Due to STEM Attrition

$$\text{Tuition}_{\text{Loss}} = \text{STEM}_{\text{Dropout}} \times \text{Tuition}_{\text{Annual}} \times \text{Dropout}_{\text{Years}}$$
$$\text{Workforce}_{\text{Loss}} = \text{STEM}_{\text{Dropout}} \times \text{STEM}_{\text{StartingSalary}}$$
$$\text{Tax}_{\text{Loss}} = \text{Workforce}_{\text{Loss}} \times \text{Tax}_{\text{Rate}}$$

- **Results:**
  - **Lost Tuition Revenue: $143M**
  - **Lost Workforce Earnings: $310M**
  - **Lost State Tax Revenue: $21.7M**

- **Total Economic Loss: $475M annually**

Step 3: Project Economic Recovery from Increased STEM Retention

$$\text{Recovered}_{\text{Economic}} = \text{STEM}_{\text{Dropout}} \times \text{Retention}_{\text{Increase}} \times (\text{Tuition}_{\text{Annual}} \times \text{Dropout}_{\text{Years}} + \text{STEM}_{\text{StartingSalary}} (1 + \text{Tax}_{\text{Rate}}))$$

- **Scenarios Modeled:**
  - **5% Retention Gain → $23.7M annual recovery**
  - **10% Retention Gain → $47.5M annual recovery**
  - **15% Retention Gain → $71.3M annual recovery**

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3. Cost-Benefit Analysis

- **Implementation Cost: $18M One-Time Investment**
  - Faculty Training: $5M
  - Software & Licensing: $3M
  - Curriculum Development: $2.5M
  - Infrastructure Upgrades: $4M
  - Student Support & Tutoring: $2M
- **Break-even achieved within 1 year at 10% retention gain.**
- **By Year 5, Oregon sees ~$190M in net-positive returns.**

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4. Disclaimer & Research Validation

Since computational mathematics is not currently provided at Portland State University (PSU) at the freshman level, this analysis relies heavily on AI-assisted data aggregation, national STEM benchmarks, and economic modeling. All figures presented should be **independently verified**, and this document is meant to serve as a **conceptual framework** to provoke interest in further research and formal policy evaluation.

The reform proposal is **financially sound, workforce-aligned, and scalable**, making it a high-return investment for Oregon's future.