B.S./M.S. Sci & Tech / Computational Mathematics Statements

The vision of the B.S./M.S. Science & Technology / Computational Mathematics program offered by the NJ Center for Science, Technology & Mathematics (NJCSTM) is to develop a state and nationally recognized center for high performance computing and computational applied mathematics education. The mission of this five year, combined degree program is to train scientist-researchers to advance and support the role of computational infrastructure to solve problems in science, engineering, and design fields. A driving goal of the faculty and students in this program is to advance a research institute for computational and applied mathematics with the computational infrastructure to support program, university and regional scientific computing needs.

B.S./M.S. Sci & Tech / Comp Math Student Learning Outcomes (SLOs)

NOTE: SWR = scored with rubric

For the Student Earning a B.S./M.S. Degree in the Computational Mathematics Option

It is our expectation that graduates from the NJCSTM will have these characteristics:

• SLO1 (Applied Mathematics Knowledge): Graduates will be strong candidates who may continue their education by pursuing doctoral degrees in related fields of study or otherwise seek career employment in the field of applied mathematics. (KU 1 to KU4) (GE S3, V5)
  • 4 Direct Measures: Poster presentation scored with rubric (SWR, STME 3610); GRE general exam quantitative score; Oral presentation SWR (STME 4610); Thesis paper and oral defense scored against written and oral rubrics (ID 5800).
  • 1 Indirect Measure: Graduating Student Survey.

• SLO2 (Holistic Knowledge): Graduates will be versatile and resourceful scientist-researchers who can adjust to this ever-changing field because of their comprehensive, integrated knowledge of applied mathematics, chemistry/physics and biology. (KU 1 to KU 4, GE S3, V2, V4)
  • 4 Direct Measures: Lab practical SWR (STME 1603); Poster presentation SWR (STME 3610); Oral presentation SWR (STME 4610); Thesis paper and oral defense SWR (ID 5800).
  • 1 Indirect Measure: Graduating Student Survey

• SLO3 (Critical Thinking): Graduates will be able to combine critical thinking skills and applicable practical knowledge in applied mathematics in the design, performance and analysis of computational work both as an individual and as effective and productive project team members. (KU 1) (GE S3, S4)
  • 4 Direct Measures: Lab practical SWR (STME 1603); Poster presentation SWR (STME 3610); oral presentation SWR (STME 4610); Thesis paper and oral defense SWR (ID 5800).
  • 1 Indirect Measure: Graduating Student Survey
• SLO4 (Communication): Graduates will be able to verbally express themselves and communicate scientific comprehension and knowledge in both formal oral presentations and in written format clearly, concisely and accurately. (GE S1, S2, S3, V4)
  • **5 Direct Measures:** Paper and presentation SWR (GE 2024); Poster presentation SWR (STME 3610); oral presentation SWR (STME 4610); Thesis paper and oral defense SWR (ID 5800); GRE general exam verbal score.
  • **1 Indirect Measure:** Graduating Student Survey

• SLO5 (Scientific Programming): Graduates will be proficient in scientific programming, including aspects of software engineering practice including verification and validation as well as application to modern computational architectures. (KU 2) (GE S3, S5)
  • **2 Direct Measures:** Lab practical SWR (STME 1603); Thesis paper and oral defense SWR (ID 5800).
  • **1 Indirect Measure:** Graduating Student Survey

• SLO6 (Modeling): Graduates will be able to apply numerical modeling to problems in the sciences, including choice and implementation of numerical algorithms for iterative continuous and discrete systems. (GE S3, S5)
  • **2 Direct Measures:** Lab practical SWR (STME 1603); Thesis paper and oral defense SWR (ID 5800).
  • **1 Indirect Measure:** Graduating Student Survey

• SLO7 (Optimization): Graduates will be able to optimize problems with multiple variables that depend linearly or non-linearly on many discrete or continuous variables. (GE S3)
  o **2 Direct Measures:** Project SWR (MATH 5631); Thesis paper and oral defense SWR (ID 5800).
  o **1 Indirect Measure:** Graduating Student Survey

• SLO8 (Data and Visualization): Graduates will be able to manipulate, mine, and visualize large datasets. (GE S3, S5)
  o **2 Direct Measures:** Project SWR (MATH 5631); Thesis paper and oral defense SWR (ID 5800).
  o **1 Indirect Measure:** Graduating Student Survey

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Computational Math Program SLOs – as aligned with KU SLOs derived from the Institutional Mission* and GE SLOs.** Data from Direct and Indirect Measures collected each spring semester in the Capstone/Culminating Course.

* KU Student Outcomes: Kean University graduates should be able to:
  1. Think critically, creatively and globally;
  2. Adapt to changing social, economic, and technological environments;
  3. Serve as active and contributing members of their communities; and
4. Advance their knowledge in the traditional disciplines (GE) and enhance their skills in professional areas.

**General Education Student Learning Outcomes**

**Knowledge: Students will demonstrate proficiency in knowledge and content by:**
(GE K1) applying the scientific method to comprehend natural concepts and processes;
(GE K2) evaluating major theories and concepts in social sciences;
(GE K3) relating historical references to literature; and
(GE K4) evaluating major theories and concepts in the fine arts.

**Skills: Students will demonstrate the skills necessary to:**
(GE S1) write to communicate and clarify learning;
(GE S2) communicate effectively through speech;
(GE S3) solve problems using quantitative reasoning;
(GE S4) think critically about concepts in multiple disciplines; and
(GE S5) show information literacy.

**Values: Students will exhibit a set of values that demonstrates:**
(GE V1) personal responsibility
(GE V2) ethical and social responsibility
(GE V3) social and civic engagement
(GE V4) respect for diverse cultures and perspectives
(GE V5) life-long learning