

A Joint Position Statement of the Mathematical Association of America and the National Council of Teachers of Mathematics

Question: How should secondary schools and colleges envision calculus courses as part of their efforts to meet the needs of current and future populations of mathematics students?

The Mathematical Association of America (MAA)/National Council of Teachers of Mathematics (NCTM) Position

A calculus course can provide students with important foundations for a variety of further studies, particularly in mathematically intensive fields. To ensure that calculus fulfills its multiple purposes, high schools and colleges should design curriculum and instruction in ways known to promote student success. A high school calculus course should not be the singular end goal of the PK–12 mathematics curriculum at the expense of providing a broad spectrum of mathematical preparation. All calculus courses should focus on proficiencies that enable students to succeed in the wider world of mathematical studies.

Close attention to how calculus instruction is enacted is essential to educational equity and students' persistence in STEM (science, technology, engineering, and mathematics) majors. Faculty in our colleges and secondary schools should work together to thoughtfully and purposefully plan for student learning in calculus courses. Thus,

1. Courses in calculus at any level should incorporate the instructional and curricular practices detailed in the most recent recommendations from NCTM and MAA.
2. PK–12 and postsecondary institutions must address inequities in the availability of high-quality prerequisite instruction and coursework.
3. High schools and colleges must provide students with support for developing the proficiencies needed for the study of calculus as part of the broader preparation needed for success outside and beyond calculus.
4. Calculus courses in college should meet the needs of students who have studied calculus in high school as well as those who have not, and should recognize the different ways in which students will use calculus in their intended majors and careers.

MAA and NCTM recommit to taking actions consistent with and supportive of these positions. Our organizations will do the following:

- Acknowledge and work to address the inequities that arise from different levels of student access to high-quality calculus courses in high school and college.
- Support efforts to use the results of the MAA's study of Characteristics of Successful Programs in College Calculus to improve student learning outcomes and increase levels of student retention in calculus-related pathways.
- Bring high school and college faculty together to coordinate and implement instructional and curricular practices that support students in their transition from high school to college mathematics.
- Involve high school and college faculty in efforts to create new math pathways and curricula that provide for a variety of opportunities.
- Cooperate with other organizations to clarify and broaden what the final years of high school and the first years of college mathematics can and should entail.
- Contribute to continued study of the impacts of placement procedures at the high school and college levels.

Supporting Resources

- Boston, Melissa, Fredrick Dillon, Margaret Smith, and Stephen Miller. 2017. *Taking Action: Implementing Effective Mathematics Teaching Practices Grades 9–12*. Reston, VA: National Council of Teachers of Mathematics.
- Bressoud, David M. 2015. "Insights from the MAA National Study of College Calculus." *Mathematics Teacher* 109, no. 3 (October): pp. 178–85. <https://doi.org/10.5951/mathteacher.109.3.0178>.
- Bressoud, David M., ed. 2016. *The Role of Calculus in the Transition from High School to College Mathematics*. Report of the workshop held at the MAA Carriage House, Washington, DC, March 17–19, 2016. Washington, DC: Mathematical Association of America and National Council of Teachers of Mathematics.
- Bressoud, David M. 2021. "The Strange Role of Calculus in the United States." *ZDM—Mathematics Education* 53 (September): pp. 521–33. <https://doi.org/10.1007/s11858-020-01188-0>.
- Bressoud, David M., Vilma Mesa, and Chris Rasmussen, eds. 2015. *Insights and Recommendations from the MAA National Study of College Calculus*. Washington, DC: Mathematical Association of America. <https://www.maa.org/sites/default/files/pdf/cspcc/InsightsandRecommendations.pdf>.
- Charles A. Dana Center. 2020. *Launch Years: A New Vision for the Transition from High School to College Mathematics*. <https://www.utdanacenter.org/our-work/k-12-education/launch-years/launch-years-resources-and-reports>.
- Mathematical Association of America (MAA). 2015. *CUPM Curriculum Guide to Majors in the Mathematical Sciences*. Washington, DC: MAA.
- National Council of Teachers of Mathematics (NCTM). 2014. *Principles to Actions: Ensuring Mathematical Success for All*. Reston, VA: NCTM.
- National Council of Teachers of Mathematics (NCTM). 2018. *Catalyzing Change in High School Mathematics: Initiating Critical Conversations*. Reston, VA: NCTM.
- Saxe, Karen, and Linda Braddy. 2015. *A Common Vision for Undergraduate Mathematical Sciences Programs in 2015*. Washington, DC: Mathematical Association of America.
- Sadler, Philip, and Gerhard Sonnert. 2018. "The Path to College Calculus: The Impact of High School Mathematics Coursework." *Journal for Research in Mathematics Education* 49, no. 3 (May): pp. 292–329. <https://doi.org/10.5951/jresmetheduc.49.3.0292>.
- Seymour, Elaine, and Anne-Barrie Hunter, eds. 2019. *Talking about Leaving Revisited: Persistence, Relocation, and Loss in Undergraduate STEM Education*. New York: Springer.