Abstract: The Mars Rover Celebration and Mars Rover Curriculum (MRC) for grades 3-8 are centered around an open-ended, student-led collaborative project to design a mission to Mars. This curriculum incorporates up-to-date SMD education resources and science and mission data relating to NASA’s explorations of Mars. The MRC focuses on the adventure of learning and discovery, asking participating teams to propose their own scientific mission to Mars, design a rover to carry it out, and present a mock-up at an open house. The curriculum is structured to be inquiry-based throughout. The “students choose the mission” structure is highly engaging. The latter half of the curriculum presents the Engineering Design Process and walks the students through the steps of designing and engineering a spacecraft/rover to meet the mission objectives chosen by the students. Students are introduced to engineering using the design-project approach. The six-week project period culminates in a public celebration at which students present their missions to members of the community including undergraduate and graduate students in science, engineering, and education fields; university faculty in these fields; and professionals from associated industries.