THE SPACEWARD BOUND FIELD TRAINING CURRICULUM FOR MOON AND MARS ANALOG ENVIRONMENTS. J. C. Rask[1], J. Heldmann[2], H. Smith[3], M. Battler[4], K. Fristad[5], M. Allner[6], T. Clardy[7], O. Clark[8], C. Taylor[9], R. Citron[10], B. Corbin[11], G. Negron[12], J. Skok[13], L. Taylor[14], F. Centinello[15], A. Duncan[16], A. Fan[17], S. Pavon[18], W. Sutton[19], V. Drakonakis[20], C. Gilbert[21], S. Graves[2], G. Guzik[22], R. Sahani[23], C. P. McKay[2], [1]Enterprise Advisory Services Incorporated, NASA Ames Research Center, Moffett Field, CA 94035, jrask@mail.arc.nasa.gov, [2]Space Sciences Division, NASA Ames Research Center, Moffett Field, CA 94035, [3]Utah State University, Logan, UT 84341, [4]Univeristy of New Brunswick, Saint John, NB Canada E2L 4L5, [5]Goddard Space Flight Center in Greenbelt, MD, 20771, [6]University of North Dakota, Grand Forks, ND 58202, [7]Hummelstown, PA 17036, [8]University of Guelph, Guelph, ON Canada N1G 2W1, [9]Georgia Institute of Technology, Atlanta, GA 30332, [10]University of Chicago, Chicago, IL 60637, [11]University of Central Florida, Orlando, Florida, 32816, [12]Colegio La Piedad, Carolina, Puerto Rico, [13]Cornell University, Ithaca, NY 14853, [14]University of Washington, Seattle, WA 98195, [15]State University of New York at Buffalo, Buffalo, New York 14260, [16]Utah State University Research Foundation, North Logan, Utah, 84341, [17]Stanford University, Stanford, CA 94305, [18]Swiss Federal Institute of Technology, 1015 Lausanne, Switzerland, [19]University of Illinois in Urbana-Champaign, Urbana, Illinois 61801, [20]University of Patras, Rio, 26500 Patras, Greece, [21]McGill University, Montreal, QC Canada H3A 2T5, [22]Florida Institute of Technology, Melbourne, FL 32901, [23]Massachusetts Institute of Technology, Cambridge, MA 02139.

Introduction: The members of four Spaceward Bound crews have developed a comprehensive training curriculum during mission operations in two-week full-scale immersive simulations of living and working on the Moon and Mars at the Mars Desert Research Station (MDRS) near Hanksville, Utah. The curriculum is designed to train students in the fundamentals of Moon and Mars analog station operations, logistics, fieldwork, and scientific investigation. Our efforts build upon the enormous experience base of the previous 51 MDRS crews and many crew training suggestions [1]. Spaceward Bound is an educational program organized at NASA Ames Research Center in partnership with The Mars Society [2].

Background: The Spaceward Bound training curriculum serves as a framework to train field scientists and future astronauts in a wide range of skills necessary for working on the Moon and Mars or analog field environments here on Earth.

Curriculum content. The curriculum is composed of directions, lesson plans, suggestions, protocols, images, diagrams, figures, checklists, worksheets, experiments, and references that introduce students to the skills needed for fieldwork, lab work, and facility operations at MDRS. The curriculum discusses crew member positions and their duties, Habitat system function and engineering, navigation and Global Positioning System (GPS) use, transportation and all terrain vehicle (ATV) operations, extravehicular activities (EVA) (Figure 1), space suit simulator use and maintenance, standard field and laboratory techniques used in biology and geology, *in-situ* resource utilization, remote sensing data interpretation, communications, teamwork, first aid, logistics, project management, equipment repair and troubleshooting, Greenhab operations, astronomy and use of an observatory, software, electronics, field documentation methodologies, crew transitions and handoff activities.

Figure 1. Spaceward Bound students develop and utilize field skills during EVAs at MDRS.

Curriculum development process. The Spaceward Bound curriculum development was initiated during the crew rotations at MDRS that took place between November 2006 and March 2007 [3]. MDRS Spaceward Bound crews 52, 53, 54, and 55 were composed of commanders with previous MDRS experience and undergraduate and graduate students. Each commander served as the editor of content generated by each crew.

Recommendations: At this time, the curriculum is considered to be an evolving document that will continue to be updated and expanded. While the information in the curriculum is written at an introductory level, it is recommended that it be modified to create a more advanced version in anticipation of actual field operations on the Moon and Mars. Additionally, a

standard tool kit should be created and provided to all students who come to MDRS to complete the training. Finally, we suggest that students who complete the Spaceward Bound curriculum training at MDRS be awarded university credit or a similar recognition of accomplishment. Therefore, a partnership with an accredited institution that will provide this service needs to be established.

References: [1] R. Kobrick, et.al., *IAC-06-E1.5.4*, (2006), [2] NASA Quest Spaceward Bound Website http://quest.nasa.gov/projects/spacewardbound/ (2007), [3] Mars Society Spaceward Bound Crew Field Reports http://www.marsstuff.com/MDRS/fs06/ (2007).

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