

The Invisible Universe Online: A Distance Learning Course on Astronomical Origins for Teachers

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As our scientific knowledge base is rapidly changing, there is a clear need to provide teachers with both current science content and effective teaching strategies for including astronomy in the classroom. One approach that is working well is to use NASA-sponsored science as a foundation on which to build graduate courses for teachers. Delivered to in-service teachers via the Internet, the 15-week long course, *The Invisible Universe Online: The Search for Astronomical Origins for Teachers*, covers the chain of events from the birth of the universe through the formation of galaxies, stars, and planets. The course curriculum focuses on scientific questions, technological challenges, and space missions pursuing the search for origins. The course goals are to: develop scientific background knowledge of astronomical objects and phenomena with peak emissions outside of the visible region of the electromagnetic spectrum; understand contemporary scientific research questions related to understanding how galaxies formed in the early universe and how stars and planetary systems form and evolve; describe strategies and technologies for using non-visible wavelengths of EM radiation to study various phenomena; integrate related issues of astronomical science, technology, societal issues, and career guidance for classroom teaching; develop specific strategies for implementing concepts in the NRC National Science Education Standards related to "invisible" astronomy and the search for astronomical origins. Each week, teacher-participants use a series of classroom-tested, inquiry-based hands-on lessons and participate in asynchronous on-line discussions regarding these activities and assigned readings. Teacher-participants also complete four curriculum projects throughout the semester to reinforce and implement course content in their classroom settings.

The first offering of this course was taught to twenty-four middle and high school teachers during the Spring 2002 semester. Extensive formative and summative evaluation data was collected and will be analyzed and incorporated into future offerings. The course was developed and initially offered with the support of SOFIA and SIRTf EPO Programs, two NASA missions associated with the Origins Program. The course provides a platform for investigating distance learning approaches for future SOFIA and SIRTf education efforts.