Introduction: Astrobiology is the quintessential cross-disciplinary science; supporting numerous non-traditional connections under its umbrella (e.g. Astrophysics and Biology; synthetic chemistry and Microbiology), and fostering new ways of looking at things. At the same time, a recognized challenge to communicating Astrobiology in an academic setting has been to maintain disciplinary depth while synthesizing diverse concepts [1]. The challenges faced in training “emerging” scientists, science majors at the undergraduate level, are very different than communicating Astrobiology to the general public, to the K-12 level, or to established scientific researchers. To explore and address some of these challenges, a new semester-long course entitled “Astrobiology: The Planetary Context of Life” was taught in the Department of Biology at East Carolina University (ECU) for the first time in Fall 2009. The course was intended to communicate astrobiological concepts to approximately 30 undergraduate majors and 5 Master’s students in Biology. The course explored numerous concepts in astrobiology, a number of vehicles for delivering the content, and a series of texts to accompany the lecture topics. This work discusses the successes and challenges of delivering astrobiology content to a disciplinarily-trained audience.

Astrobiology at ECU: The audience for Astrobiology: The Planetary Context of Life consisted of students who had already completed diverse training in common scientific prerequisites (i.e. Physics, Chemistry) as well as Biology-specific topics (genetics, ecology, and evolution). Of the approximately 600 undergraduate Biology majors at ECU, more than 80% of them intend to pursue a health-science related career path. The composition of the Astrobiology course consisted of a similar demographic. Functionally speaking, Astrobiology provides elective credits towards their undergraduate major, and because of the scientific writing content associated with the course, provides the students with writing intensive credit towards their degree as well.

The semester-long course was divided into three modules based upon temporal progression. The section “The Past” covered topics along the lines of star and planet formation and geologic history. “The Present” covered aspects of fossil, molecular, and phylogenetic records of Biology on the modern day Earth, and the concept of habitability. Finally, “The Future” covered aspects of astrobiological targets for space exploration, mission design, and technologies. The textbook “Planets and Life” was used during the first iteration of this course [2], but other resources including the Astrobiology Primer [3], a Nation Research Council report on Organic Life in Planetary Systems [4], and current scientific papers were utilized as well. The course made frequent use of news and images on the NASA website, and videoseminars on the NASA Astrobiology Institute (NAI) website.

A hallmark feature of the Astrobiology course was the involvement of guest speakers from throughout NAI within both the classroom setting as well as in the form of departmental lectures, which were videorecorded (and will serve as a future resource). Speakers during this first year included H.J. Cleaves from CIW, S. Ono from MIT, E. Boyd from Montana St., S. Vance from JPL, K. Edwards from USC, and J. Rummel from ECU. The speakers and students actively engaged in the informal classroom setting and meetings afterwards- which served not only to communicate Astrobiology, but as a form of career mentoring.

In addition to exams, the students were expected to actively participate in the course, to keep a running astrobiology journal of current events, in-class group exercises, and notes from the speakers, and to produce a Wikipedia-style term paper on an Astrobiology topic of their choice. The graduate students served as peer reviewers and editors in the term paper project which consisted of producing an abstract, a draft, and then finally a 3-5 page final product. The intent was that this collection of mini-reviews would serve as a resource for future versions of this course.

Successes and Challenges: Although it was not the original intent, Astrobiology played a role as a capstone course within the traditional Biology curriculum at ECU. Several students commented about how Astrobiology gave them perspective as to the connections between the array of other courses they had taken as part of their major- and several stated that it was the best course they had taken in college. Some of the challenges that were faced during the first iteration of this course included finding an appropriate textbook in terms of level and content. Another challenge was finding the right balance between utilizing videoconferencing and discussion boards versus face-to-face interactions. Maintaining topical continuity was also a challenge given the range of materials covered and the involvement of guest speakers.
A survey was conducted at the end of the fall semester, and feedback will be implemented in the next version of this course. Due to its’ successes, even within the first year, Astrobiology has become a permanent course offering at ECU and will be taught next in Fall 2010.