

# Overcoming Challenges: Creating an Astrosociology Curriculum

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**Abstract.** Astrosociology is a new and emerging field that is a significant departure in the study of human behavior and interaction. The development of this field is important because wherever there are humans in space, their society, culture, and psychology will follow and demand consideration in this new environment. As it currently stands, neither the social sciences nor the hard sciences can provide a suitable curriculum for this new field. This paper will suggest courses of study for both, an undergraduate level and a graduate level astrosociology program as well as possible difficulties and challenges that both professors and students could encounter. These difficulties could include issues with funding a program that could be considered “unusual” or “unnecessary”, as well as the lack of support within both the social sciences and the natural sciences. The interdisciplinary nature of the program also receives discussion.

**Keywords:** Astrosociology, Graduate Education, Social Sciences

**PACS:** 01.30.Ib, 01.40.Di, 89.65.Ef, 01.40.G-, 87.23.Ge, 89.65.-s

## INTRODUCTION

With spaceflight promising to become more affordable to the general population and less the domain of a few select well-trained individuals, space and society will become more entwined, likely resulting in a greater need for social scientists with an expertise in space. However, how does one develop this academic approach when the traditional space fields and the social sciences seem diametrically opposed? Social science disciplines especially seem reluctant to offer astrosociology-related materials within their curricula, while the space community has taken some preliminary steps to integrate astrosociology. For example, the American Institute of Aeronautics and Astronautics (AIAA) allowed the formation of an Astrosociology Working Group. Still, the AIAA’s actions are limited to professional space conferences and do not include the curricula of educational organizations.

For those professionals who have long since finished with their education and already established in their field, the change is perhaps easy to make. Just start publishing small articles and presenting at conferences and soon you will be well on your way to becoming an expert. But what about those students who are just starting out and finding their way into this new field? What if they know this is what they want to do with their lives? For most social scientists, the answer may lie in walking the hallowed halls of academia as a graduate student. Unfortunately for these potentially budding astrosociologists, there appears to be a dearth of astrosociological (or related) curricula development for either undergraduate or graduate level studies. While this paper does not design a specific introduction to astrosociology/space social sciences class, it intends to provide a core plan of study for someone who wishes to start on the road towards a career in the space social sciences. Moreover, the newly formed Astrosociology Research Institute (see; <http://astrosociology.org>), a nonprofit California public benefit educational corporation, now exists to assist students in their pursuit of astrosociology within the hallow walls of academia.

## ASTROSOCIOLOGY IN EDUCATION

According to Pass (2009), astrosociology is defined as “the study of astrosocial phenomena (i.e., the social, cultural, and behavioural patterns related to outer space).” This refers to the study of the space program and other space-related areas from the viewpoint of a social scientist. An astrosociology curriculum would include such areas such as future of space colonization/settlement (or space society), space policy and law, space ethics, space psychology, and the societal impact of the space program as well as the inner workings of the space industries. Thus, it represents a wide variety of areas in which to specialize. However, this wide variety of areas seemingly lacks adequate representation within graduate school curricula. While there are some programs that will allow the study of extreme psychology or human factors psychology, few programs offer a comprehensive and integrated space social sciences program. Currently, only a handful of programs specifically offer space-related social science courses. For example:

- The University of North Dakota offers a Master of Science degree in Space Studies, where courses are primarily divided into two general areas, technical and social (see; <http://www.space.edu/aerospace/masters.php>). All students are required to take a minimum of two courses in each area and either must pass a comprehensive examination covering what they have learned or write and defend an interdisciplinary thesis before they are awarded their masters. The technical courses include traditional areas such as space engineering, planetary science, and applications, while the policy/social science area offers law, policy, history, and business, all from a space perspective.
- The International Space University, located in Strasbourg, France, offers two Master of Science degrees although a third program Master of Business Administration in Executive Space is forthcoming (see; <http://www.isunet.edu>). Of the two Masters of Science degrees, the degree in Space Studies concentrates on the more technical aspects while Space Management concentrates on the managerial side. Summer-only sessions are also held that rotate to different locations throughout the world.
- The George Washington University (GWU) offers a Masters of Arts degree in International Science and Technology Policy (see; <http://www.gwu.edu>). Further, the GWU, Space Policy Institute - The Elliott School of International Affairs - (see; <http://www.gwu.edu/~spi/>) offers graduate space policy courses, lectures, workshops and internship opportunities. The program does not appear to offer any technical courses.

Although these three universities offer specific courses or programs of study that offer coursework in the space social sciences, it would not be difficult to imagine more space social science and related research occurring under the auspices of a program such as the History of Science and Technology or other Interdisciplinary Studies programs.

While these programs all have their various strengths, University of North Dakota for a more technical education, International Space Business for space policy, and George Washington for space policy, none of these schools appear to prove a truly comprehensive space social science education. Additionally, none offers doctoral degrees in any of these areas. This presents a problem for many students.

So, what of the students who have completed their masters in a space-related field? Where is the Ph.D. program for them to join if they so desire? Do they apply to traditional social sciences areas and specialize in a more mainstream area of social science until such a time as an astrosociology degree becomes available? Do they apply to an interdisciplinary department in the hopes that they might be able to cobble together a curriculum for themselves?

When most potential Ph.D. students look into applying to graduate schools, they try to match with an advisor prior to their application. Students who are able to match well with the strengths offered by the department seem to have a much better chance at gaining that elusive acceptance letter. Unfortunately, the field of astrosociology is still early in its development cycle, and even those known to support Astrosociology generally do not list this area as one of their main interest areas. This can make it even harder on a Ph.D. student desperately trying to get into the field, much less trying to work out an appropriate plan of study.

## Graduate Curriculum

In order to create a fitting astrosociology curriculum, it is important to realize the interdisciplinary and crossdisciplinary nature of the field. According to Jacobs (1989), an interdisciplinary approach is defined as:

“a knowledge view and curriculum approach that consciously applies methodology and language from more than one discipline to examine a central theme, issue, problem, topic, or experience.”

A cross-disciplinary approach means “viewing one discipline from the perspective of another.” Thus, an astrosociology program should offer an integrated social science curriculum with a crossdisciplinary focus. However, one of the vital aspects of an interdisciplinary program is to assure a foundation in the basic fields prior to learning about the interdisciplinary subject. As the current focus is on a graduate program of study, one assumes that a basic proficiency in one of the subjects covered already exists (Jacobs, 1989).

Although it is difficult to know exactly what traditional department, if any, would adopt an astrosociology concentration, much less be able to incorporate that into a rough program of study, the credit (Cr.) breakdown in Table 1 assumes a self-designed Ph.D. program where one does not have to satisfy departmental requirements. In the event of departmental core courses, one may replace the suggested courses above. However, in addition to the field's core courses, an additional core course for astrosociology should be required. An "Introduction to Astrosociology" course should be offered as an astrosociology core course for the concentration and should cover the basics of astrosociology, including aspects of space policy and law, space and society, space business, space tourism, and space psychology. This course could also serve as an elective for those not opting for the astrosociology concentration.

**TABLE 1.** Graduate Education Suggested Plan of Study

<b>Social Science Foundation Core</b>	<b>Cr.</b>	<b>Space Humanities/ Space Social Sciences Core</b>	<b>Cr.</b>	<b>Traditional Space Science Core</b>	<b>Cr.</b>	<b>Other</b>	<b>Cr.</b>
Survey of Astrosociology	3	Space Policy	3	Human Factors Engineering	3	Language	6
Russian Culture*	3	Space History	3	Human Space Life Sciences	3	Internship	3
Human Performance in Extreme Envir.*	3	Space Law	3	Statistics	3	Dissertation Research	24
Group Dynamics*	3	Space Business and Economics	3	Astrobiology	3	Electives	12
Cognitive Science*	3	Space Psychology	3	Astronomy/ Geology	3		
Subtotals	15		15		15		45
						Overall total	90

(\*) indicate a course which could otherwise be replaced if the potential astrosociology student is in a social science department which mandates other core courses.

The courses such as Russian Culture, Human Performance in Extreme Environments, Group Dynamics, and Cognition that were suggested would likely be useful if these courses are already offered in the university. “Russian Culture” or a course along those lines might be particularly useful since Russia has been such a significant part of the history of space exploration. A well-designed course in “Human Performance in Extreme Environments” would discuss not only space, but also human physiological, emotional, and psychological performance in submarines, mountaineering, polar exploration, and so forth. “Group Dynamics” (or Social Groups) and “Cognitive Science” courses would be considered natural courses in order to understand the basics of the human social and psychological experience in more general terms.

For students majoring in this concentration, it would be vital to encourage, if not require, students to take interdisciplinary courses in the space social sciences as well as electives in more traditional space related fields such as astronomy, geology, astrobiology or microbiology, engineering, and so on. The space social science portion of the program would consist of five basic sections: space policy, space history, space law, space business and economics, and space psychology. Since several of these areas are broad enough to cover several possible courses and allow students to choose which course would be more beneficial to them, or allow professors more leeway in the areas for which they wish to focus their class. For example, some potential courses that would count as a space history classes could include History of Astronomy, History of Manned Spaceflight, History of the Soviet Space Program, History of American Space Program, History of New Space/“Alt Space,” The Shuttle Era, and related areas. Of course, any social sciences departments that offer a course relating to space or the space program should encourage astrosociology students to take their courses.

For the traditional space fields, courses in Space Life Sciences, Human Factors Engineering, Astrobiology, Astronomy or Geology, and a Statistics course, would help provide a basic foundation in which to understand the science behind the space program and space phenomena in more detail. Unlike the space social science section, three of these suggested subjects, Engineering, Statistics, and either Astronomy or Geology, are found in many universities. Astrobiology might be a bit of a stretch, but if no dedicated astrobiology class exists, a course in microbiology or extremophiles might be a good alternative. This leaves only the Space Life Sciences/Biomedical Sciences that may not be offered already within existing departments and programs.

Astrosociology students should also be encouraged to take internships if such internships are available and can be found. In general terms, collaboration between astrosociology/the social sciences and the space community serves as an important goal for the field inside and outside of academia. Language courses, or at least the ability to read in one of the “official” languages besides English, might increase research opportunities. This coursework, in combination with the resources and support necessary to write an astrosociology dissertation, would provide good training for future astrosociology students and allow them to participate in this growing field. In addition, extracurricular activities such as space-related clubs and activities could serve a student well when looking for employment following their academic careers.

## **Undergraduate Curriculum**

Once implementing a graduate program, it may be just a matter of time before an undergraduate program is considered. Since undergraduates often have to consider general education requirements as well any foundation courses required for their major, the concentration must, by necessity, not be as in-depth as the graduate curriculum. At the same time, students could prepare themselves by taking the right applicable general education courses as part of their plan of study.

Looking back at the categories offered in Table 1, the curriculum is divided into three categories, Social Sciences, Space Social Sciences/Space Humanities, and the Traditional Space Science courses, each of which is further divided. In this case, due to the different schedules involved and the demands on the student’s time and the necessity to take different courses, it might be best to have only a few specific courses that are required and just require students to distribute their credits in this way with approved courses as shown in Table 2, where some of these courses could also satisfy general education requirements imposed on the students. Further, departmental requirements for a major could be placed in the social science foundation core, although it may require an increase in earned credit hours.

## **Possible difficulty in curriculum implementation**

Unfortunately, with the creation of any new program, several potential difficulties could arise that require addressing before the implementation of any new program. An interdisciplinary field, such as astrosociology is no exception. Some difficulties include the possible financial burden of a new program. The question of what department would be its “home,” which is qualified to teach some of the core courses, pressure from professors, students, or parents, and possible lack of student interest.

**TABLE 2.** Undergraduate Education Suggested Plan of Study for an Astrosociology concentration.

<b>Social Science Foundation Core</b>	<b>Cr.</b>	<b>Space Humanities/ Space Social Sciences Core</b>	<b>Cr.</b>	<b>Traditional Space Science Core</b>	<b>Cr.</b>
Survey of Astrosociology	3	3 courses	9	Statistics	3
2 addit'l courses	6			2 addit'l courses	6
Subtotals	9		9		9
				Overall total	27

The first step would be to decide on which department to choose for the initial home for this new field. Many traditional social sciences departments do not seem to have the need or the desire to take on a student who has such atypical interests. More traditional space related departments, such as astronomy, planetary sciences, and geology, do not seem to encourage their students to take courses in the social sciences. This lack of support from either side may cause a problem for future astrosociology students. The most obvious choices would be either a sociology department or an anthropology department; as both are more similar than they are different in comparison to other social sciences. Both anthropology and sociology include "applied" subfields, where the skills learned in the classroom are applied to projects that are more practical.

In hard economic times, budgetary discretion is often used as a reason why interdisciplinary programs do not get started or, if they do, they do not grow (Feller, 2007). The financial costs for interdisciplinary programs include several unique expenses and limitations.

“Faculty who accept extra course loads to develop and launch new seminars can do so for only a few semesters unless additional faculty are hired to teach their core courses. And access to the classrooms, laboratory space, and new equipment necessary for new interdepartmental or inter-college initiatives must compete with pre-existing claims on these resources” (Feller, 2007).

Difficulties with finding enough money to fund a new interdisciplinary venture are particularly felt in public universities where there has been a reduction in state appropriations (Feller, 2007).

“The result has been increased pressure on institutions to “protect the core”; few resources have been available for more than modest implementation of ambitious plans to introduce new interdisciplinary programs. Although no systematic evidence exists on this point, gleanings from sources such as *The Chronicle of Higher Education*, *Inside Higher Education*, and *Science* suggest that private research universities, using unrestricted endowment funds and foundation awards, have been announcing new interdisciplinary programs at a much higher rate than have public universities” (Feller, 2007).

This problem not only affects public universities but also interdisciplinary education throughout primary and secondary schools (Jacobs, 1989).

A large potential barrier could be the professors who might also be unwilling to participate in an interdisciplinary program due to their current workloads (McWilliam *et al.*, 2008). Additionally, the interdisciplinary faculty, or the addition of an unusual concentration, is “likely to be experienced as an unwelcome disruption to an otherwise predictable and protected existence.” Other problems include:

“assessing the quality of publications outside mainstream disciplines; apportioning credit for multi-author papers, especially when collaborators are from multiple disciplines or institutions; apportioning responsibility among different academic units for the initial financial or resource commitments needed to compete for major interdisciplinary funding; divvying up the indirect-cost allotments that may accompany such funds; determining who will control space and capital-intensive facilities; and agreeing on standards for recruiting and evaluating faculty with joint appointments” (Feller, 2007).

Not only could pressure by the professors kill the program, but also the parents and students who are paying tuition and the alums from where the universities receive donations from may not like their university or school taking a

chance on an experimental or interdisciplinary field (Jacobs, 1989). Parents in particular might pressure their children from taking an interdisciplinary course or degree (Jacobs, 1989).

## CONCLUSION

The creation of an astrosociology curriculum has many challenges that must be overcome before any university can begin to offer degrees in the subject. These barriers include the difficulties of creating a graduate and then undergraduate curriculum that is suitable for the needs of the students without overburdening professors and without causing excessive financial burden on universities. With the knowledge of these barriers, proponents of astrosociology can work to overcome these challenges and allow astrosociology to become a potential major or concentration to flourish.

Assistance from the space community, including collaborations with professors in the “hard” sciences, could prove to be a powerful strategy in gaining acceptance of astrosociology as a unique, self-contained field. For example, existing astronomy programs could add an “Astrosociology of Astronomy” course that concentrates on the ties between space exploration and societal concerns as well as social change. This could serve as a preliminary step before the introduction of astrosociology into a social science program or the development of one of the suggested interdisciplinary programs designed above and allowing the expansion of astrosociology into additional universities.

If humans continue to be involved in space exploration and an increase in human activity proves to become reality, humanity will need to bring the social sciences into the Space Age in a manner consistent with other social realities under traditional study. With the development of astrosociology in the first decade of the twenty-first century, it seems like an appropriate time to move this important field into academia. The timing seems right, as the training of new astrosociologists – and the programs to support them – will take time to develop.

## ACKNOWLEDGMENTS

The author would like to extend a heartfelt thank you to Dr. David Webb, co-founder of the University of North Dakota’s Department of Space Studies and later department chair of the International Space University, for relaying the story of how he came up with the original curriculum of the UND program. That knowledge made writing this paper much less stressful than it otherwise would have been. Thank you also to Dr. David Livingston, host of The Space Show, who provided some much needed feedback on early drafts of this paper. Also, thank you to Dr. Paul Hardersen of the University of North Dakota’s Department of Space Studies who provided feedback on the graduate curriculum section.

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