International Space University
Space Studies Program 2020

CALL FOR ACTIVITY PROPOSALS

(OPEN TO ISU COMMUNITY AND ALL INTERESTED SPACE PROFESSIONALS)

22 June – 21 August 2020

Shenzhen University, Shenzhen, China

Response Deadline: 15 September 2019

This is an open call to the International Space University community to support the 2020 Space Studies Program. ISU is herewith soliciting responses from all space professionals, ISU alumni, former visiting lecturers, or anyone else who would like to contribute to the success of the academic program as a department or team project faculty member or as a visiting lecturer. The SSP academic activities are briefly described below. For more information, see: ssp.isunet.edu

The SSP is formatted in three interrelated phases

- Phase I (Core): Weeks 1-4 that include core lectures, workshops, departmental activities, and initial team project work
- Phase II (Department): Weeks 4-6 that include core lecture wrap-up, departmental activities, workshops, departmental visits, individual project work, and team project work
- Phase III (Team Project): Weeks 6-9 focused solely on team projects completion.

Program Element Descriptions

Core Lectures – Series of up to 60 one-hour lectures given over the course of the first four weeks of the program covering fundamental concepts across all disciplines.

Workshops (WS) – 4-hour sessions focused on disciplinary or interdisciplinary topics, which must include hands-on or participatory interactive experiences for the participants.

Departmental Activities (DA) – Three-hour sessions focused on specific departmental activities to include in-depth lectures, workshops, professional visits, individual or small team project work, or any other active learning activity deemed appropriate by the department chair.

Team Projects (TP) – SSP participants address a relevant space topic as an international, interdisciplinary, and intercultural team to produce a final report and executive summary for broad distribution in the space community. For SSP20, ISU Academic Council has selected four team projects (see appendix).

What We Need

The SSP team is soliciting specific proposals for:

- Workshops / workshop-series
- departmental activities
- team project activities
- other academic activities such as panel discussions or debates

The SSP Director along with the Core, Department, and Team Project Chairs will review all proposals and responses resulting from this call and select those most relevant to the specific goals for SSP20. The SSP Director or relevant Chair will contact you if your support is requested. You will also be notified if your support is not required this time.

Who We Need

Workshop Instructors: We are seeking individuals to suggest topics for, and to lead, 4-hour sessions focused on disciplinary or interdisciplinary topics, which must include hands-on or participatory interactive experiences (ie. role plays, simulations, etc.) for the participants.

Workshops take place during Phases I & II (23 June – 31 July 2020)

Department Instructors: We are seeking individuals to suggest topics for, and to lead, 4-hour sessions focused on specific departmental activities to include in-depth lectures, workshops, professional visits, individual or small team project work, or any other active learning activity deemed appropriate by the department chair. Individuals who would like to participate as department faculty, i.e. those who are available to support a department for a minimum of one full week, should also respond to this call.The SSP departments are Space Humanities (HUM), Space Management and Business (MGB), Space Engineering (ENG), Human Performance in Space (HPS), Space Sciences (SCI), Space Policy, Economics, & Law (PEL), and Space Applications (APP).

The departmental activities take place during Phase II (13 July – 31 July 2020)

Team Project Instructors: We are seeking individuals to suggest topics related to the Team Projects, and to lead one and one-half or three-hour sessions focused on a topic relevant to the TP. The four Team Projects selected by the ISU Academic Council are described in the appendix. Individuals who would like to participate as TP faculty, i.e. those who are available to support a team project for a minimum of one full week, should also respond to this call.

TP work spans all three phases of the program becoming the sole focus in Phase III, which is the last three weeks of the SSP session (3 August – 21 August 2020)

NOTE: This call does NOT seek core lecturers. Core lecturers are identified and invited by the SSP Director and Core Chairs only.

How to Respond to this Call

Responses to SSP20 Calls will be accepted through **ISU Involve Platform** ONLY.

- If you have not already done so, you will need to create an account **on ISU Involve Platform** (involve.isunet.edu) using your preferred e-mail address and password.

- Complete the online form providing all requested information.

If you have any questions, contact us via e-mail: sspacademics@isunet.edu

Evaluations

The SSP Chairs and Academic Coordinator nominate faculty and visiting lecturers during, and in the months including and following the Curriculum Planning Meeting (December 2019). The SSP Director appoints the faculty and visiting lecturers based on the recommendations of the Chairs and Academic Coordinator, pursuant to the ISU Academic Handbook.

Important Dates

- Response to Call due: **Sunday, 15 September 2019**
- Response Submitted to Chairs: **23 September 2019**
- Evaluations: **October 2019-April 2020**
- Acceptance Notifications: **NLT 30 April 2020**
- Visa application: **minimum 2 months prior to your dates of travel** ***(3 months recommended)***

You will be notified if you are not selected. These notifications will be sent by 13th of May 2020.

APPENDIX – SSP20 TEAM PROJECTS

The Team Projects for SSP20 that were selected and approved by the Academic Council are described below.

TP #1 – On-Orbit Mobility and Manipulation

Controllable on-board propulsion is essential for trajectory correction, orbit insertion, station keeping, rendezvous and other satellite and deep-space purposes. For many years, people have been concerned over its use in anti-satellite weapon systems. Today this concern has become more important because society is increasingly dependent upon the plethora of vulnerable space services. Proposals for new international agreements to ward off a space arms race are circulating, but most experts are pessimistic, at least in the near term. As well, established technologies now permit the creation of spacecraft that can rendezvous with existing spacecraft and repair, refurbish or (in LEO at least) deorbit them. This development further increases the concern that such spacecraft might be used for nefarious purposes. The goals of this team project are to assess the present situation and document practical ways for the world to continue to enjoy the benefits of maneuvering technology (including new uses such as debris removal, clean-up, and planetary defense) as well as to examine servicing opportunities brought about with the development of robotic technologies for in-orbit servicing while reducing the chance of these technologies being misused. In addition, the project will define the technical and management character of a complete ground-based and space operations system consisting of multi-purpose buses and special-purpose payload assemblies for servicing a variety of ongoing missions.

All of the required technologies for both peaceful and space-war maneuvering have been demonstrated, including interception and destruction of satellites. In view of the acknowledged obstacles to a prompt resolution of the problem of military space aggression, an independent, interdisciplinary analysis could prove useful as a contribution to multinational discussions and bilateral agreements. The venues for these discussions and agreements are already in place at the UN, EU and other international policy centers. New methods for conflict resolution are being applied; e.g., by the Western Justice Center. Of equal importance is the history of the Hubble Space Telescope, which shows the potential value of on-orbit repair and refurbishment. In addition, there is a growing need for means to change the orbits (including deorbiting from LEO) of retired space objects to reduce orbital congestion and collision hazards. Human flight for these purposes was shown to be effective in the Shuttle era, but now robotic execution should be considered as a practical alternative.

Given the variety of needs, robotic interceptor spacecraft should consist of common buses and unique servicing payloads. The buses for such spacecraft should exploit

high-powered electric propulsion to enable visiting multiple and varied targets, particularly given that current missions (e.g., Dawn) have shown the potential of using electric propulsion for visiting multiple targets and operating in varied orbits, capabilities now available for servicing. Orbital congestion is a rising hazard. Servicing provides the prospect of both scheduled mission extension and mission salvage after on-board failure. The report from this TP should address not only problems associated with controllable satellite mobility and manipulation, but also potential opportunities, for example, those presented by the planned development of high-powered electric propulsion plus nonaggressive uses of repurposed military space assets. The problem and its solutions are intrinsically international. No solution can be accepted without multicultural public support.

Main Issues to be addressed:

- Movement in several nations toward renewed development of anti-satellite weapon systems.
- Lack of understanding of the potential of new maneuvering techniques.
- Absence of public appreciation of these potential problems and support for innovative solutions.
- Limits of knowledge about servicing opportunities in the world's existing space fleets.
- Lack of practical designs for interceptor robotic spacecraft and operations.
- Absence of workable program plans for international multi-purpose servicing projects.

TP #2 - International Cooperation on the Use of the China Space Station

The Chinese space station is scheduled to be completed and put into operation around 2022. The Permanent Mission of China to the United Nations and other international organizations in Vienna and the United Nations Department for Outer Space Affairs jointly issued a bulletin on opportunities for international cooperation on the Chinese Space Station, inviting countries and institutions from all over the world to cooperate in space science experiments on the Chinese Space Station. According to the Announcement of Opportunities for International Cooperation on the Use of the Chinese Space Station, the Chinese Space Station is open to all countries, organizations and private entities, providing scientists around the world with the opportunity to conduct space science experiments on the Chinese Space Station. This is not only a new attempt for China, but also the beginning of a new era of international space cooperation for countries, organizations and individuals all over the world.

Main issues to be addressed:

- On board experimental projects design and conduct
- International Astronaut Selection and Training
- Relations with the existing International Space Station
- Innovative project design
- Design and organization of Science Popularization Activities and other cultural programs.
- Reserve and communication mechanisms in policy areas such as definition of intellectual property rights, cultural integration and international space law.

TP #3 - The Space Medical Centre

Many medical questions are still opened when planning crewed missions in outer space, especially beyond Low-Earth-Orbit. Long-term human body adaptation might lead to severe medical conditions with the potential of a dramatic impact on the mission success. In addition, there is a risk of unseen medical conditions as the humans would be exposed to extra-planetary environments for the first time. The use of advanced technology and autonomous systems can help but it, up to now, is not comprehensive yet. Then, re-entry is always a rule, not feasible for missions beyond LEO.

There is a need of a more immediate solution, as a framework that would facilitate the management of health in space and that be accessible to a larger number of people: the Space Medical Centre (SMC).

This is a platform to be built in space by scratch or by using already existing space objects. The SMC is: (i) a clinic, (ii) an emergency centre, (iii) a rehabilitation centre and (iv) a training centre. This platform could be located anyway, and could include movable parts that would travel in space in the proximity of the medical emergency. The SMC is used by astronauts and tourists. Moreover, considering the importance of clinical and translational medicine, the SMC guests researchers, participants of human studies, and people seeking for a new treatment of terrestrial disease. In the end, the SMC is a reference platform to be used by medical insurances for medical coverage of astronauts and tourists.

To allow the SMC to exist, a business model needs to be established facing legal challenges that have to account of medical assistance in outer space. Then, as the platform can be composed by movable parts and can have twin stations, placed between destinations, the use of resources shall be addressed as the SMC shall be almost independent from natural terrestrial resources. What is the impact of the SMC on the incoming crewed missions? What is its impact on terrestrial medicine (in terms of health, business and research)?

Main issues to be addressed:

Up to now, there is no space medical insurance both for astronauts and space tourists so the monetary evaluation of medical conditions is opened. The legal challenges of providing medical assistance in space, and the safety, ethics and contamination are still opened. In particular, the case of combined terrestrial and space treatments includes considerable legal and medical opened challenges.

TP #4 – Intercontinental Sub-Orbital Commercial Liner

From the space shuttle in 1980s to commercial suborbital/orbital travel in recent years, rapid intercontinental passenger/cargo transportation using aerospace technology will likely be commercialized. This concept could be based on a kind of fully re-used rocket-boost sub-orbital passenger/cargo vehicle (or any other technical approach), which vertically launch at the launch site in/near the airport, with a vertical landing rocket booster and a sub-orbital manned vehicle horizontally landing at the target airport. It could achieve safe and convenient two-hour intercontinental passenger/cargo transportation for the business elites and the general public.

The use of reusable space transportation technology to build a fast and convenient intercontinental passenger/cargo flight has great commercial value in the future, and its related technical, commercial and legal issues are worthy of investigation.

Main issues to be addressed:

- An overview of the technical route of the intercontinental sub-orbital commercial flights
- Intercontinental sub-orbital commercial flight technologies
- Management organization definition
- Business plan and financing plan proposal
- International legal issues and main provisions involved in this project