International Space University
Space Studies Program 2023

CALL FOR ACTIVITY PROPOSALS

(OPEN TO ISU COMMUNITY AND ALL INTERESTED SPACE PROFESSIONALS)

26 June – 25 August 2023

São José dos Campos, Brazil

Response Deadline: 31 October 2022

This is an open call to the International Space University community to support the 2023 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 about SSP and SSP23, see: isunet.edu/ssp and ssp23.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 55 lectures given over the course of the first four weeks of the program covering fundamental concepts across all disciplines.

Workshops (WS) and Theme Days – These sessions focus on disciplinary or interdisciplinary topics, which include hands-on or participatory interactive experiences for the participants. Workshops and Theme Days take place during Phases I & II (27 June – 4 August 2023).

Departmental Activities (DA) – These sessions focus 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. The departmental activities take place during Phase II (17 July – 4 August 2023).

Team Projects (TP) – SSP participants address a relevant space topic as an international, interdisciplinary, and intercultural team to produce a final report, executive summary, and an academic presentation available in open access to the broad space community through the ISU library. 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 (7 August – 25 August 2023).

What We Need

The SSP team is soliciting specific proposals for:

- Workshops / workshop-series
- Theme Days
- Departmental activities
- Team project activities
- Other academic activities such as panel discussions or debates

Under the authority of the Dean, and supervision of the Academic Council, 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 SSP23. 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 (i.e., role plays, simulations, etc.) for the participants.

Workshops take place during Phases I & II (25 June – 4 August 2023)

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 (17 July – 4 August 2023)

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 three 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.

The TP introductory activities take place during Phase II (17 July – 4 August 2023)

NOTE: This call does NOT seek core lecturers.

How to Respond to this Call

Responses to SSP23 Calls will be accepted through ISU Buzz Platform ONLY.

- Your application should be submitted through the https://buzz.isunet.edu/propose-activity

- Complete the online form providing all requested information.

Evaluations

Under the authority of the Dean, and supervision of the Academic Council, SSP Chairs and Academic Coordinator nominate faculty and visiting lecturers during, and in the months including and following the Curriculum Planning Meeting (December 2022). The SSP Director appoints the faculty and visiting lecturers based on the recommendations of the Dean, the Academic Council, the Chairs and the Academic Coordinator, pursuant to the ISU Academic Handbook.

Important Dates

- Response to Call due: **Sunday, 31 October 2022**
- Response Submitted to Chairs: **7 November 2022**
- Evaluations: **November 2022-April 2023**
- Acceptance Notifications: **NLT 30 April 2023**
- Visa application: **minimum 1 month prior to your dates of travel**

You will be notified if you are not selected. These notifications will be sent by 13th of May 2023.

APPENDIX – SSP23 TEAM PROJECTS

The Team Projects for SSP23 that were selected and approved by the Academic Council are described below.

TP #1 – Smart Cities in the Context of Latin America: Space-based Solutions

According to United Nations reports, in 2020 about 55% of the world population lives in urban areas, and this percentage is expected to reach 70% by 2050. This reality is already true in several countries, as in Brazil, for example, where almost 85% of the population lives in so-called urban areas considered. For these people, life quality is directly affected by the quality of the urban environment they inhabit. This is certainly one of the reasons why cities went frequently though technological, economic, and cultural innovations in order to provide better coexistence conditions to their citizens. In this scenario, a concept called Smart Cities (SC) is growing around the world, which use high technology to solve complex problems and optimize resources usage, thus improving human life quality. The SC concept is often associated to the design from scratch of new urban areas based on efficient and sustainable technological solutions. However, fully consolidated cities have been also trying to promote innovations and adopting good practices following this concept. Singapore and Dubai are working in this direction, for example. In Brazil, São José dos Campos became the first city to qualify as a SC. Several other Brazilian cities are working hard to achieve the SC qualification. However, these efforts can be very challenging the more complex the city is. The reality in the big cities in Brazil, but also in Latin America, Africa, Asia and other developing countries, deal with high population densities, irregular housing (which are very vulnerable to climate changes), reduced mobility, environmental and noise pollution, high crime rates, poor public services, and low sanitation. The adoption of SC solutions can help to address these cities' main issues with a huge social impact. The United Nations is also concerned about the SC concept including in the “2030 Agenda” the theme Responsible Cities and Communities as the Sustainable Development Goal 11 (SDG 11). However, the discussion of urban life quality reaches several other SDGs, such as Health and Well-being, Clean Water and Sanitation, Clean and Accessible Energy, Economic Growth, Resilient Infrastructure, Reduction of Inequalities and Actions against Global Climate Change.

Main Issues to be addressed:

This Team Project proposes to point out “space-based technologies and applications” (downstream) to solve (or advance in the knowledge of) the current problems faced by the Latin America large cities, trying to demonstrate the economic viability of solutions from the perspective of social and environmental impacts, and indicating future potential markets. In Brazil and in many other countries, space is a sector somewhat distant from the routine of the common citizen, although it is responsible for the creation of many technologies that we currently use on our daily lives. The change of

paradigm of the space sector (the so-called New Space) represents an opportunity to address social needs, creating a market for space services (upstream and downstream) and improving the citizens' life quality. In this context, the Team Project intends to discuss and evolve towards a strong integration of all dimensions of human intelligence, collective intelligence, and also artificial intelligence within the city. This intelligence will help address with high population densities, irregular housing, reduced mobility, environmental and noise pollution, high crime rates, poor public services, and low sanitation. Moreover, it is important also to address the economic, political and social impacts and costs associated to the main challenges and also the knowledge and space technologies, gaps and opportunities for SC solutions, technological feasibility, market potential, economic viability, and business plan.

TP #2 – Water Security

Science clearly points out the impacts that climate change generates on the hydrological cycle, changing past patterns, from more severe and prolonged droughts to extreme rain events. Considering the UN definition of water security ("the ability of the population to access water of acceptable quantity and quality for the maintenance of their livelihoods, well-being and socioeconomic development, associated with the protection of water resources from pollution and disasters, as well as the preservation of ecosystems within an environment of peace and political stability"), advancing on the understanding of the implications of climate changes on sustainable development, focusing on the perspective of water, is presented as an extremely relevant priority. In a dynamic and uncertain future, obtaining timely information with the necessary quality is crucial managing resources, for identifying vulnerabilities and for adaptation measures, and space science tools have an important role to play in such theme.

Main issues to be addressed:

Given that the majority of these climate change impacts will be felt through the medium of water, the TP shall explore the interrelationships and inter-linkages between water, climate change and sustainable development. Water security necessarily requires the exchange of knowledge so that the human, economic, ecosystem and resilience dimensions are actually protected. Hence, aligned communication, recognition of epistemologies and results must be transparent and synthesized in an aligned manner.

TP #3 – On-Orbit Collision Avoidance Support Service, a safer Space supported by Space Situation Awareness (SSA) Systems

The teams involved in the TP are requested to propose a framework for an On-orbit collision Avoidance Support Service. To provide collision avoidance, this service should be able to:

- Provide services based on a continuously updated catalog of satellite tracking data,
- Utilize automated processes for collision avoidance,
- Provide actionable and timely conjunction assessments, and
- Provide data to operators to enable assessment of maneuver plans.

To ensure safe coordination of space traffic in this future and international operating environment, the teams should also think in policy and legal aspects involved in the creation of a Coordination Center to operate as the focal point for this collision avoidance support service.

Main issues to be addressed:

1) Review of main types of sensors and system architectures used for SSA that are already in operation
2) Define a framework of Sensors, possibly including Ground Based and Space Based solutions, to continuously provide data for catalog updating. Aspects related to trade-off analysis, advantages and disadvantages associated to the adoption of a particular solution should be explicit
3) Propose On-orbit tracking aids for operating satellites, including beacons, or sensing enhancements (if such systems are needed)
4) Define Minimum Safety Standards and Best Practices for Operating in a Congested Space Environment using either existing protocols as the U.S Government ODMSP as reference or proposing new criteria considering future scenarios as large constellations in LEO and missions beyond Near Earth's orbit. These safety guidelines should consider maneuverability, tracking, reliability, and disposal.
5) Identify basic Data Quality Criteria and Appropriate minimum reliability based on type of mission and phase of operations to attend the precision requested by the Minimum Safety Standards

6) Define different scenarios for Sensor allocation to meet Data Quality criteria (e.g., Possibility to fuse data from a Telescope and a Radar to improve the uncertainty associated to the observations.)

7) Define what inputs of information should be provided to the On-Orbit collision avoidance service, e.g.:
   - Management of orbit utilization to prevent conjunctions.
   - Constellation owner-operators' management of self-conjunctions.
   - Owner-operator notification of planned maneuvers and sharing of satellite orbital location data.
   - Notifications in advance of planned orbit injections.

8) Propose a standardized protocol for Data Sharing that enables the development of applications to leverage the data. The teams should evidence the advantages and disadvantages associated to the adoption of a particular existing protocol (e.g., TLE, CCSDS) or in the proposition of a new data format (if necessary).