

Request for Proposal

University of Toronto Space Design Contest

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Section 1.0 Introduction

1.1 Space Design Contest: Space Training and Educational Facility

Imagine a future where humanity has colonized outer space and where spacecraft regularly ply orbits and trajectories. Imagine a future where you can work amongst the pristine, tranquil hills of the moon, or travel to impressive, solitary space settlements where thousands of humans call home. That future is a testament to our vision and perseverance.

This future will not be possible, however, without the hard work and dedication of many people. And before they can tame the wilds of space into an organized, safe environment suitable for human habitation, they will need to understand the nature of space, and what their role will be in developing it. They will need a space-oriented education.

The year is 2055 and the Space Development Union (SDU), a not-for-profit organization backed by industry giants, wishes to establish a facility to train students, perhaps from a young age, to understand and work in space. Although it is possible to achieve part of this education on Earth, SDU strongly believes it will be necessary for students to train and learn in space.

The SDU is seeking proposals for the design, development, and operation of such a facility. Your firm has decided to bid on the contract.

Section 2.0 Project Summary

2.1 Overview

This project tasks you and your company (team) with designing an in-space educational and training facility and curriculum. It is organized by the University of Toronto Space Design Contest (UTSDC), a student organization at the University of Toronto that is affiliated with the University of Toronto Student Union (UTSU) and University of Toronto Engineering Society (SKULE). The following document serves to outline both the requirements of your design in the contest described above and to detail the arrangements for registering and participating in this contest.

2.2 Contest Summary

Please read Section 3.0 carefully, as it details the entire process of the contest. Note the registration deadline and contestant workshop in December, written report submission at the end of March, and the design fair and conference in May. The workshop and the design fair and conference will be held at the U of T St. George campus. In addition to a presentation of your team's design, the conference will feature activities and trips to immerse your team members in the University of Toronto and Canadian aerospace research. It is an overnight event. Registration for the contest features an electronic and a mailed component; read Section 3.0 for this information.

2.3 Technical Summary

All of the actual details required in your contest submission, including technical, economic, and procedural requirements, are explicitly defined in section 4.0, submission requirements. You may wish to incorporate the existing structures from past contests into your design. Winners of past contests, and their design reports can be found on the UTSDC website (www.utspace.com).

2.4 Evaluation

The winners of the contest will be determined by the judging of each team's proposal, presentation, and display. The proposal will be weighted at 60% and the other two deliverables will each be weighted at 20% each. See Section 3.0 for an overview of each deliverable, Section 4.0 for the technical requirements of the proposal, and section 5.0 for evaluation criteria.

Section 3.0 Instructions to Teams

3.1 Registration Submission

Contestants are required to complete a team registration form located on our website (www.utspace.com) under the “registration” section. A registration fee of \$80 must be sent in to accompany registration. Payment must be made in cash, cheque, or money order. It can be mailed in, dropped off, or brought in to the contestant workshop. Note that if it is dropped off, it cannot be cash.

All contestants must complete a health form and a release form. These can be found on the website under the “documents” section. These should be printed and completed, and submitted with the report.

For the purposes of mailing or dropping off, the address is as follows:

University of Toronto Space Design Contest
c/o U of T Engineering Society
Sanford Fleming Building, Suite B740
10 King’s College Rd.
Toronto, ON M5S 3G4

This location is in the basement of the Sanford Fleming Building.

3.2 Project Timeline

The project has several deadlines that are important to note. The registration deadline is **December 28, 2008**. Contestants must register online and mail in the registration fee before this date.

Final written reports are due on March 30, 2009, and the health and release forms for each contestant should be attached. Reports with the forms can either be submitted in person during the hours of 9 a.m. to 4 p.m. Monday through Friday in the week leading up to the deadline, or on Monday March 30 itself. Alternatively, reports along with the forms may be mailed and postmarked no later than Friday March 27.

The Design Fair and Conference is May 14-17, 2009. Presentation materials do not need to be submitted prior to the presentation during the design fair and conference. Immediately prior to a team’s presentation, a copy of written presentation materials and references are due. Students are encouraged to develop their own timeline and milestones to keep their project on track.

3.3 Proposal Submission and Evaluation

3.3.1 Documents Required

The University of Toronto Space Design Contest requires that each team submit two copies of their proposal, one hardcopy and one electronic. The hardcopy will be used for judges to write comments and will be returned to the contestants. This copy should be bound in some way to facilitate judging. A penalty will be assigned for submitting a hardcopy that is not bound (see Section 5.1.3). The other copy should be emailed to judging@utspace.com for UTSDC to keep as reference.

3.3.2 Judging Method

The judging chairs of the UTSDC will oversee all aspects of judging, including the judging of the reports, presentations, and displays. The report will be given a score based on a standardized marking scheme. Different aspects of the proposal will be scored separately, with the overall quality of the document in mind. The score will either be the average of several judges' scores, or a single score as determined by a group of judges on collaboration. For information on what content needs to be included in the report, see Section 4.0. For information on the details of judging, see Section 5.0.

3.3.3 Academic Honesty

The University of Toronto Space Design Contest takes academic honesty very seriously and any team that has been found to plagiarize material will be disqualified from the contest. Plagiarism includes using diagrams not made or sections of text not written by the contestants. Any fact, piece of information, idea, diagram, etc. that is to be included in any part of the contest *must be cited*. This means any documents must have either embedded citations (and a works cited) or footnotes. *Simply using a bibliography is not acceptable.*

3.4 The Design Fair and Conference

3.4.1 Overview

At the design fair and conference, which will take place on May 14-17, 2009, each team is expected to both bring a display and give a presentation. The presentation should be an overview of the team's design and curriculum. The display should be visually appealing and should include important or interesting information from the team's proposal. For the display, contestants will be expected to discuss their proposal with a group of judges.

3.4.2 Design Fair Presentation

At the design fair and conference, each team is expected to give a presentation to a panel of judges. The presentation, which should be at maximum 10 minutes, should be a brief overview of the team's proposal. There will be an additional 5 minutes at the end of the presentation for questions from the judges. The presentation should include the major design features or innovations of the proposal, with particular emphasis on the curriculum of the facility.

A panel of judges will mark the teams and their score will be determined by either the averaging of the scores of each judge, or as a result of collaboration of the judges. For details on how the presentation will be marked, see Section 5.0.

3.4.3 Design Fair Display

Each team should bring a display to the design fair and conference. The display should be visually appealing and should contain important information about the team's design. Teams are encouraged, but not required or limited, to use models, diagrams, or graphs. Students may also bring a laptop with media or material for the display.

Each display will be given a score based on the quality of information displayed, visual appeal, and the interactions of the contestants with the judges. During this part of the conference, teams are expected to stay at their displays to discuss their design with the judges. Teams are also encouraged to talk about their design with people who are not judges.

Section 4.0 Submission Requirements

4.1 Project Overview

Your company's objective is to submit a proposal for the design and operation of an educational and training facility for students in space. Your educational program may include infrastructure on Earth, but a substantial amount of education and training must be done in space.

Companies should assume the existence of:

- At least one space colony (i.e., the Tesus orbital space colony)
- At least one space hotel (i.e., space hotel designed by Celestial Eagle Technologies)
- A space emergency response system (i.e., Perseus)
- Construction projects, including that of the NOMAD lunar base
- Any space infrastructure that currently exists
- Any feasible infrastructure that could exist in outer space in 2055

Section 4.3 details the different aspects the written proposal *must* consider. Companies should not feel limited to cover only what is mentioned, but should make sure they are still creating a proposal for this specific request.

4.2 Proposal Formatting

The proposal should be written in 12-point font with a standard font type. It should not exceed 20 pages, not including any appendices. Sections that can be included in the appendices include diagrams, figures, graphs, calculations, or any other supplementary information. The main body of text should refer to the appendices when necessary. There is no limit to the length of the appendices. Proposals should include a table of contents, title page, and works cited (see Section 3.3.3). An introduction and conclusion are encouraged. Main headings should be the same as those in Section 4.3, but may be arranged differently. Headings/sections may also be changed completely *if a document is attached to the report* outlining where the required information for each of our sections is in your report.

4.3 Content of Proposal

4.3.1 Facilities

4.3.1.1 Construction *[Space facilities only]*

Your proposal should outline how it plans to build the facility in space, including a timeline of construction. Discuss how you will use existing space infrastructure to facilitate this process. Discuss where you plan to build your facility and how you plan to power it. Estimate how much investment must go into the project.

4.3.1.2 Safety *[Space facilities only]*

In this section, discuss how humans living in the space facility will be protected from harmful radiation. Discuss how life support systems for food, water, air, and waste on the facility will function. Discuss how the facility will integrate with Perseus in case of medical, criminal, or general emergencies. Discuss how the facility will deal with ailments that naturally occur in humans living in low gravity conditions, if necessary. Discuss how the facility will deal with psychological problems associated with living in space.

4.3.1.3 Architecture *[All Facilities]*

In this section, in detail show the function of all space (not outer space) in all facilities. Develop floor plans for all facilities. Detail all design features on a small and large scale. Justify why space is being used for its designated purpose. Explain how the architecture of your facilities on both a macro and micro scale facilitate the learning and training process.

4.3.2 Personnel

4.3.2.1 Staff

In this section, discuss how staff will operate and interact on the facilities. Detail how staff be used to protect the students and facilitate the learning and training process. Detail how staff will be organized and managed. Detail how staff will interact with students and each other in different contexts. Detail the hiring process for all staff, for instance what qualifications they will require to work at the facility.

4.3.2.2 Students

In this section, discuss how students will operate and interact on the facilities. Detail how students will organize and manage themselves. Detail how students will be organized by staff for the facilitation of their learning and training. Detail what kind of students will be allowed on the facility and how they can qualify to learn or train there. Discuss student

scholarships, bursaries, and fees and its affect on student life, economic sustainability, and the development of space.

4.3.3 Curriculum

4.3.3.1 Academic Curriculum

Discuss what programs or courses your facilities will offer for academic purposes. Detail what will be learned in each program or course. Explain the benefit of learning the material that will be offered. Detail how courses will be taught. Detail how equipment and other resources in your facility will be used for educational purposes. Discuss research activities ongoing in your facilities. Describe how staff and students will be involved with this research and the scientific or practical benefit of the research.

4.3.3.2 Practical Curriculum (Work Training)

Discuss what training and programs your facilities will offer for prospective space workers. Detail which jobs you will train workers for and why. Detail what will be learned and done in each training program. Explain the purpose of what is learned in terms of the job that will be occupied in the future by the trainee. Detail how the training will be taught. Detail how equipment and other resources in your facility will be used for training purposes.

4.3.4 Finances

4.3.4.1 Operating Budget

Estimate the operational costs of your educational and training program and justify the validity of the numbers. Also discuss all sources of operational (non-sponsored) revenue and determine how much the program must be sponsored per year by governments and corporations.

4.3.4.2 Justification of Budget

In this section justify why companies or governments would sponsor your company for the amount it requires per year and also for the initial investment. Discuss what returns they will gain out of it in terms of research, skilled personnel, or anything else provided directly or indirectly by your facilities and programs.

Section 5.0 Marking Schemes

5.1 Report (Proposal) Marking Scheme

5.1.1 Percentage Breakdown

The percentage breakdown of your proposal will be as follows:

36% Facilities

8% Construction

8% Safety

20% Architecture

12% Personnel

6% Staff

6% Students

32% Curriculum

16% Academic Curriculum

16% Practical Curriculum

10% Finances

5% Operating Budget

5% Justification of Budget

10% Structure and Clarity

2% Spelling and Grammar

2% Appropriate Professional Language

3% Organization

3% Aesthetic Appeal

5.1.2 Technical Criteria

The technical aspects of your report, worth 90% of the total score, will be scored based on several criteria. These criteria include detail of discussion, degree of research, use of diagrams, figures and calculations, evidence of originality, apparent effectiveness or efficiency of proposed ideas, and marketing of ideas. Your report must discuss all aspects appearing in Section 4.3, and the amount of time spent on each section should, with some leeway, reflect the percentage designations in Section 5.1.1.

5.1.3 Penalties

Penalties will be assigned to reports that do not follow the outlined formatting in Section 4.2, if there are missing citations where they are required, or if the hardcopy submitted is not bound. Penalties will not exceed 2.5% (out of 100%) and will not be less than 0.5%. The assigned penalty will be based on the severity of rule violation and the importance of the rule violated.

5.2 Presentation Marking Scheme

Presentations will be scored based on several criteria including content presented, creativity, structure, group dynamics, time management, verbal and non-verbal delivery, use of visuals or aids, and ability to answer questions.

5.3 Display Marking Scheme

Displays will be scored based on several criteria including creativity, visual appeal, quality of information displayed, quality of discussion with judges, and ability to present effectively to the judges.