Space Architecture UoS Outline

February 15, 2015

1 Project scope

The course objective is to learn how to design internal spaces in an isolated zero-g environment, focusing on human factors including but not limited to:

- Non-architectural needs (good food, entertainment in books, movies, music, computers and nature)
- Basic environmental comfort (temperature, airflow, circadian rhythms, daylight, illumination and darkness, acoustic barriers, minimum volumes, exterior observation, anthropic ergonomics, colour psychology)
- Basic personal needs (storage, privacy, separation from work and play, contact with family, self expression)

Although the focus is on human factors, consideration will have to be made to the surrounding space environment, such as:

- General dimensions for transport limitations, radiation protection, shielding materials
- Equipment and material rationalisation, including considerations on construction and maintenance processes
- Modularity, circulation, and service "risers"
- Assumptions on existing space infrastructure (communal areas, work/private divisions, scale of operations, robotics and automation, agriculture and ecosystems)

2 Deliverables

A collection of electronic documents will be produced that shows the following, as well as an exhibition-standard fabrication.

1. A proposal for a bedroom in space for a economy class space tourist (ie. not extreme luxury, but given the prohibitive costs of space tourism, a high standard of comfort is to be expected).

2. Documentation surrounding the problems identified and the prioritisation of problems, assumptions made, and justification for design decisions
3. A collection of iterations in the form of drawings or models, and short summaries of the discussions following each iteration
4. 1:1 Construction drawings
5. 1:1 Fabricated working prototype demonstrating the system

This is to be presented all together to account for 100% of the grade at the end of the 2015 academic year. If necessary, intermediate presentations will be set up or broken into two semesters if this is not possible.

3 Evaluation

There are five dimensions to be evaluated towards:

Thoroughness The design should demonstrate a range of considerations from the large assumptions to the detailing, from the many fields of landscaping, light design, acoustics, etc, and due documentation that proves this

Credibility The design should not rely on fantasy and inappropriate assumptions, a balance must be kept between structural, environment and economic realities and designs

Research The student should demonstrate relevant research for each design factor

Innovation The student should demonstrate original thinking of design solutions or combination between disciplines as opposed to simply copying existing solutions

Presentation Documentation should be well structured, and exhibition fabrications should be exhibition quality

4 Construction

The student is expected to make learn and make use of the 6-axis robot in fabrication. He may help in setting up the robot and the project will be used to demonstrate the capabilities of the robot in prototyping otherwise complex forms.

5 Further reading

Although research may vary: an emphasis is placed on official NASA (or affiliated) design documents including space settlement design archives and human factors standards.