ACE Program – Short-Course Outline

SHORT-COURSE TITLE: Space Settlement Design Academy (incorporating: Australian Space Design Competition and Junior Space Design Competition).

Staff Name: David Hughes	**Student Numbers:** ASDC: 13 JSDC: 15	**Cost:** Nil

Course Details:

Space Settlement Design Academy will develop research, design, writing and communication skills and techniques essential for competitive excellence in the ASDC. You will learn how to work as part of a multi-disciplinary team to:

- Design future space settlements
- Understand the different challenges faced when designing orbital, transiting and surface based space settlements
- Undertake independent research
- Undertake structural design
- Design spacecraft hardware
- Plan operational aspects of settlements including business strategies and proposals, budgeting and automation of construction and operation of space settlements.
- How human factors affect the overall design of a space settlement
- Prepare a company submission in response to a Request For Tender
- Create artificial gravity

Week/Date	Learning Experiences	Venue/Resources
1	*David on International Space Settlement Design Competition tour - USA* **ASDC**: Measures and procedures for mitigating the adverse health effects of living in space.	ISSDC: USA 23 July- 6 August ASDC: SI7/Senior Schooling Hub JSDC: No meeting
2	*David on International Space Settlement Design Competition tour - USA* **ASDC**: Emergency shelters on Alaskol. Emergency equipment found within each shelter. Equipment and devices and how they are used to help residents locate emergency shelters.	ISSDC: USA 23 July- 6 August ASDC: SI7/Senior Schooling Hub JSDC: No meeting
3	*David on International Space Settlement Design Competition tour - USA* **ASDC**: Primary construction machinery, showing how it shapes and manipulates raw materials or structural components into finished form.	ISSDC: USA 23 July- 6 August ASDC: SI7/Senior Schooling Hub JSDC: No meeting
4	**JSDC**: Movie Storyboarding ASDC: Alaskol business ventures and planning for the capabilities of the settlement to accomplish the specified tasks; Sources of construction materials and equipment; Location of Alaskol on the moon.	ASDC/JSDC: SI7
5	**JSDC**: Robots and computers that people will encounter during their everyday lives in Alaskol; Making your Movie; Images ASDC: Overall exterior view of settlement, with major visible features (e.g. solar panels, antennas), showing pressurised and non-pressurised sections; Overall maps or layouts of interior land areas, to show usage of areas;	ASDC/JSDC: SI7
6	**JSDC**: Making your Movie; Scripting **ASDC**: required quantities of air, food, power (for residents), water, waste handling, communications devices and internal transport vehicles; Automated systems and how they are used to guide spacecraft from lunar orbit to Alaskol and back into orbit	ASDC/JSDC: SI7
7	**JSDC**: Making your Movie; Editing **ASDC**: Port facility layout; Procedures for protecting the settlement from the lunar environment; Airlocks and their intended purpose.	ASDC/JSDC: SI7
8	**JSDC**: Final Movies due for entry into Competition. **ASDC**: Steps of settlement assembly; personnel and cargo-handling vehicles; number and type of amenities available in each house/ apartment/ room/ block of rooms; Community design and locations of amenities and infrastructure, with a distance scale; Charts and tables detailing recreational activities available for off-shift workers. Floor plans of individual rooms (with dimensions) and living quarters' layouts.	ASDC/JSDC: SI7
9	**ASDC**: Charts and tables to show separate costs associated with different stages of construction; Cash Flow Diagrams;	ASDC: SI7

Culminating Event/Outcome:

Students will compete against teams from other schools from across Australia for the opportunity to compete in the JSDC or ASDC Finals, held at the University of Queensland in January, 2016 (Top 8 qualifying schools in Australia compete in the ASDC Finals). Participation in the ASDC Finals could lead to possible participation in the International Space Settlement Design Competition (ISSDC), held in the USA in July/August, 2016.

Each year a new space settlement scenario is offered that challenges students to design.

Alignment to Faculty Improvement Plan/priorities:

ASDC/JSDC combines elements of Science, Engineering, Maths and Technology as well as Business and Art (STEAM). Students participating in the competition are required to design a significant infrastructure development in space while considering a range of issues including structural engineering (Physics and Technology Studies), Human Factors (Biology), Communications (Physics and Technology Studies), Food Production (Biology), Energy Requirements (Chemistry and Physics) and transportation (Physics).

Costing breakdown:

The qualifying competition does not involve a cost, however should the ASDC team qualify for the Australian Finals (Held in January, 2016) there is a cost of approximately $170.00 to participate. There is no additional cost for students competing in the JSDC.

Should the ASDC team then go in to win the Australian Finals the students then have the opportunity to form the core of the Australian team to compete in the International Competition in the USA, held in July/August (2016). This opportunity includes tours of various NASA facilities, Washington and New York. (Approximate cost $4 500 – $5 000 for 14 – 17 day tour.