THE UNIVERSITY OF MELBOURNE

Space health for medical students launches in Melbourne

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Department of Medical Education

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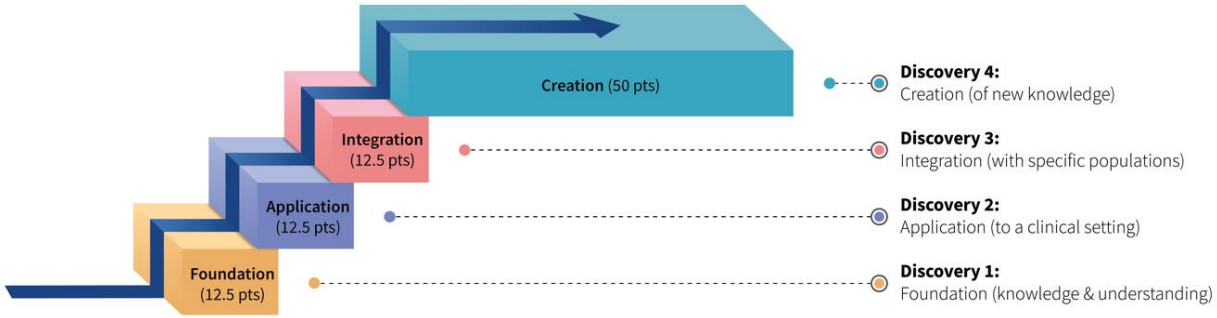
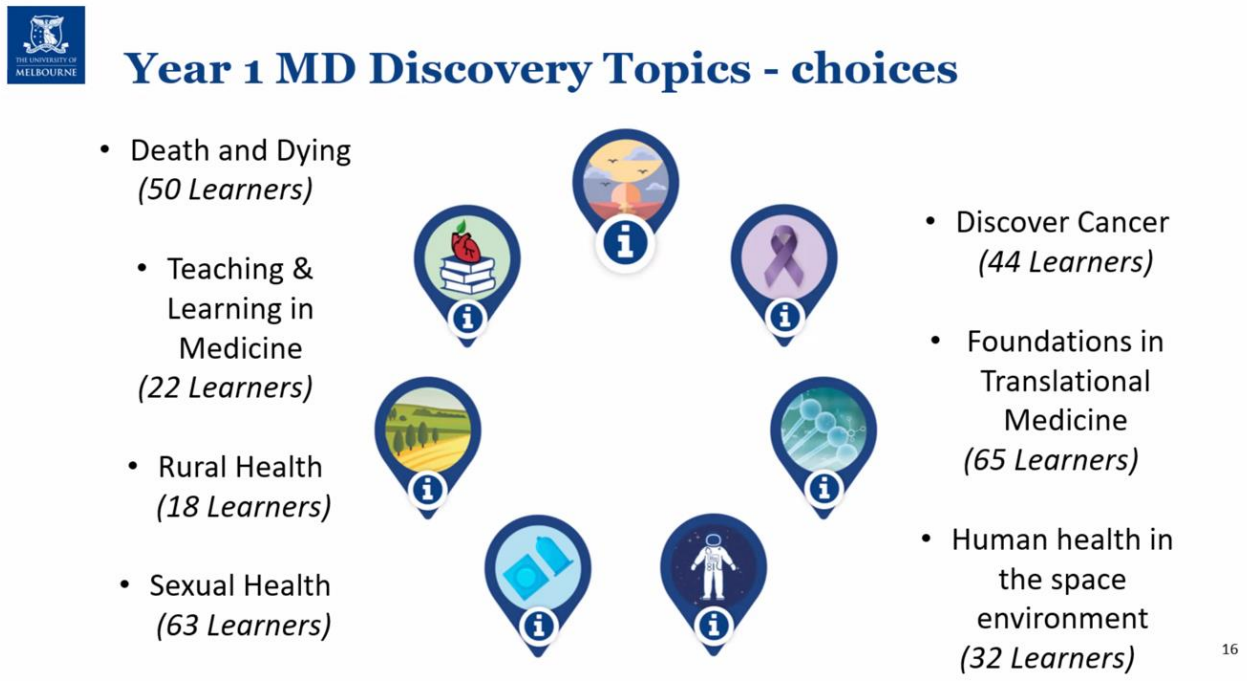
The restructured MD program from 2022

Redesigned MD course structure

MD 1	**Foundations for Clinical Practice (FCP)** 81.25 CP Integrated research training		**Discovery 1** Foundation 12.5 CP	**Student Conference** 6.25 CP
MD 2	**Principles of Clinical Practice 2 (PCP2)** 81.25 CP Integrated research training		**Discovery 2** Application 12.5 CP	**Student Conference** 6.25 CP
MD 3	**Principles of Clinical Practice 3 (PCP3)** 81.25 CP Integrated research training		**Discovery 3** Integration 12.5 CP	**Student Conference** 6.25 CP
MD 4	**Transition to Practice (TTP)** 43.75 CP	**Discovery 4** Creation 50 CP Integrated research project		**Student Conference** 6.25 CP



Human health in the space environment



This topic will enable students to explore how human physiology responds to the space environment - how and why each body system adapts, and corresponding 'countermeasures'.

This year-long mission will span space as an extreme environment, lessons from the history of human spaceflight, and the remaining challenges for humans journeying beyond to the Moon and Mars.

It will highlight the translational potential of space research for health on Earth.

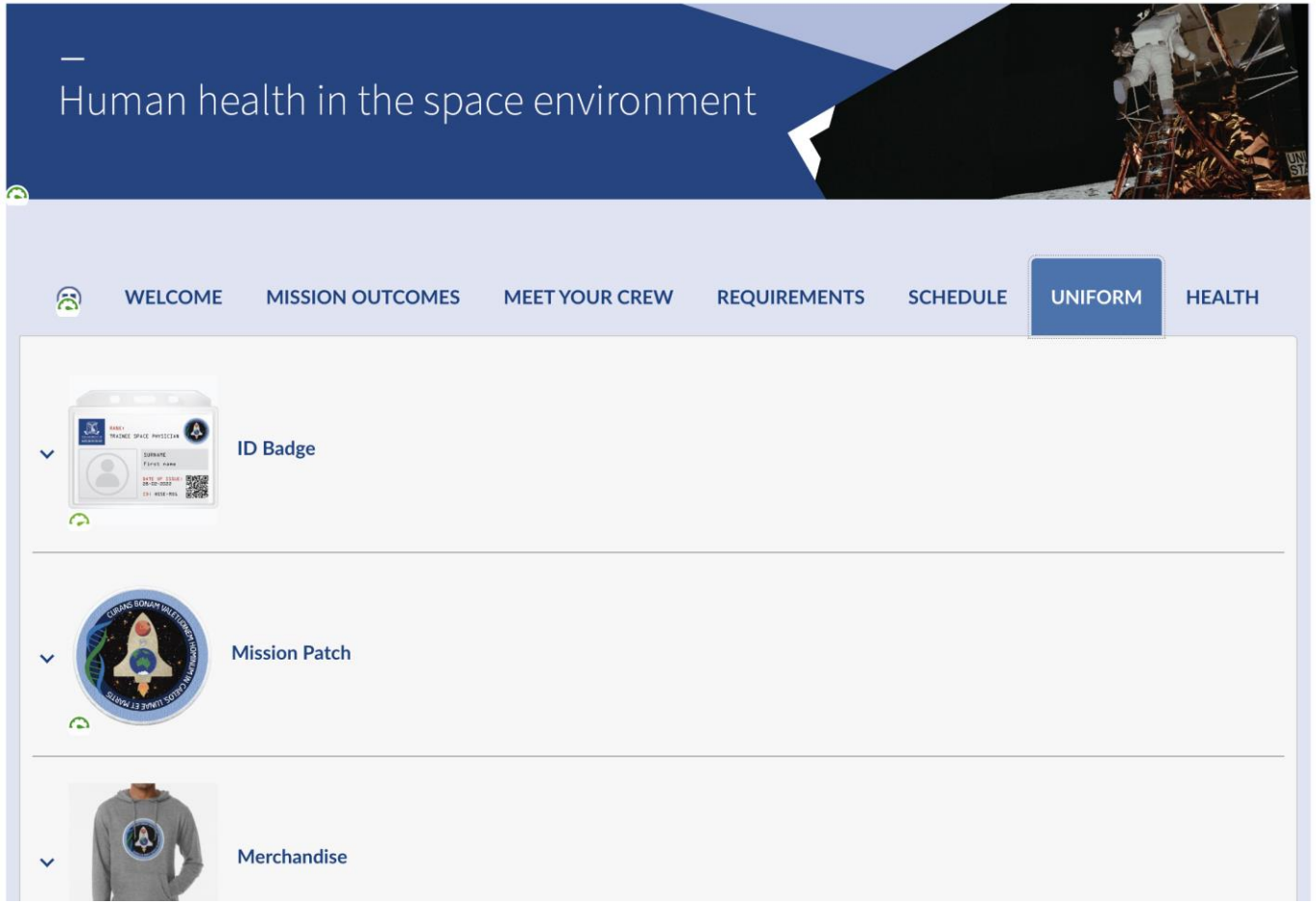
This topic would be ideal for students who have a real interest in space medicine or those who want to develop further their understanding of physiology.

Human health in the space environment

Learning outcomes:

- Describe how human physiology adapts to the space environment.
- Understand the important role that gravity plays in normal physiological homeostasis.
- Identify the major physiological and psychological challenges for humans living and working in space.
- Describe some of the countermeasures currently in use and recognise their terrestrial translational potential.
- Understand that lessons are learned from both the history of human spaceflight and ongoing research.

The Latin means "*caring for good health of humans who fly out into the heavens, to the Moon and Mars*".



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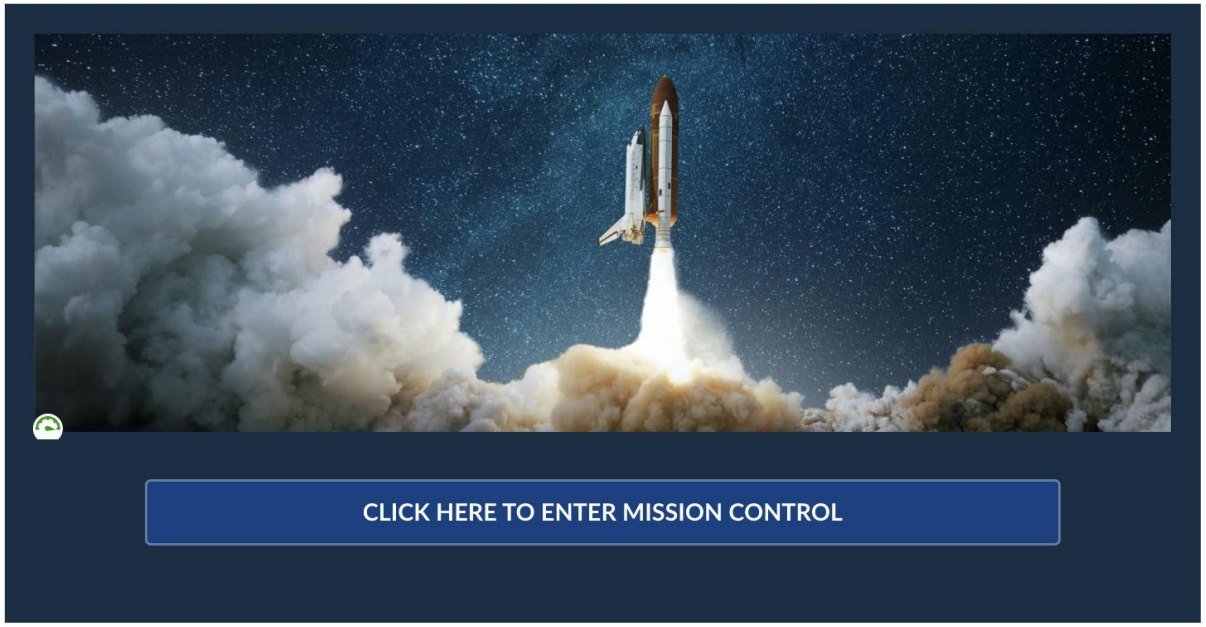
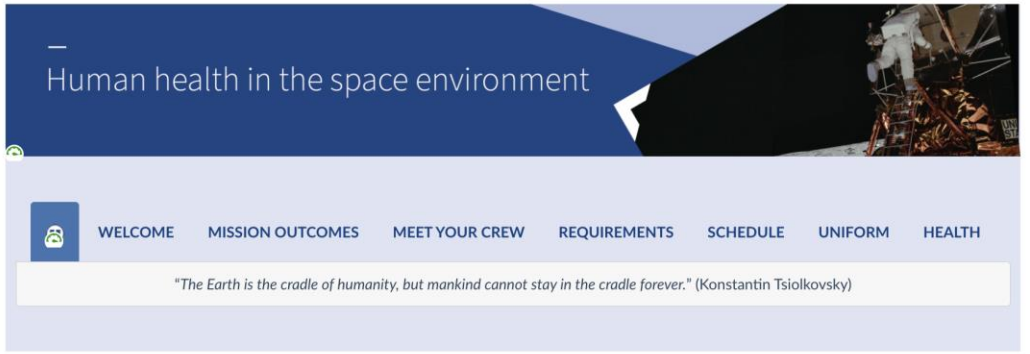
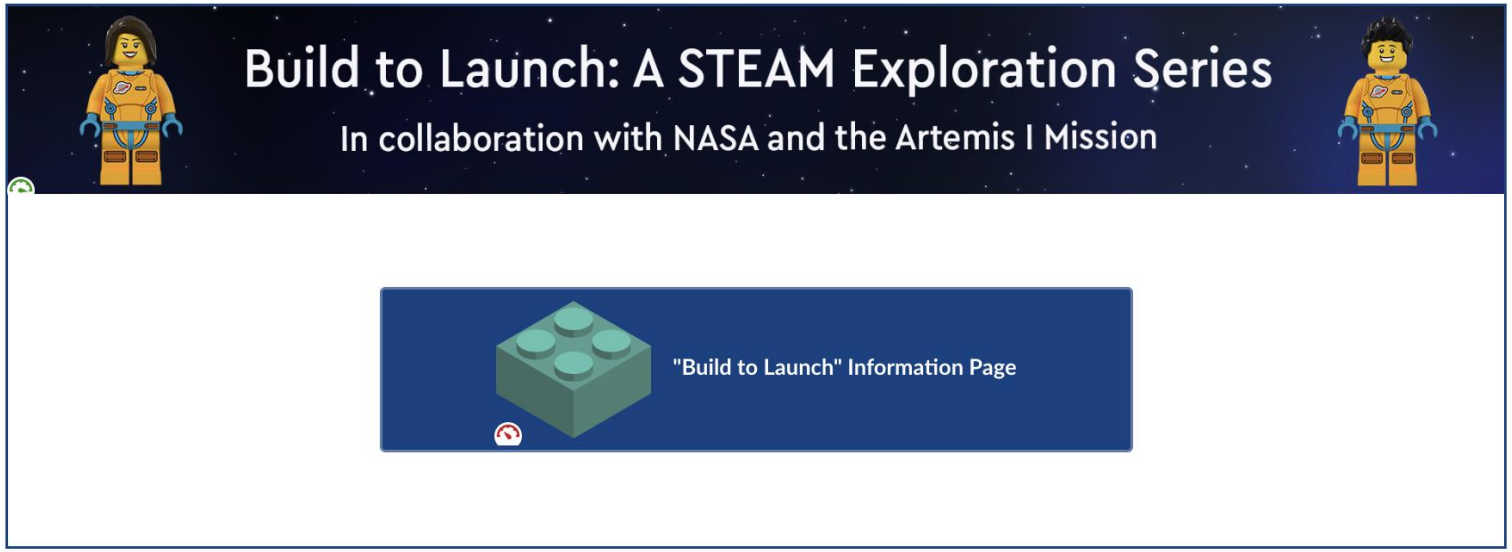


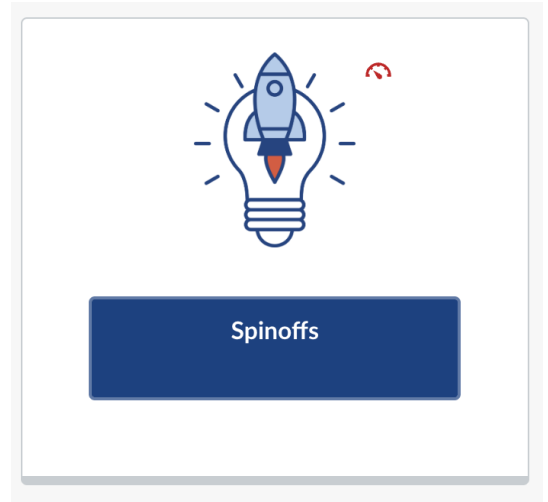


Human health in the space environment

Dates	MD Week		Space Health (24)			
30-Jan	1	Induction Week				
6-Feb	2	Foundation				
13-Feb	3	Foundation				
20-Feb	4	Foundation		**2023 Schedule**		
27-Feb	5	Foundation				
6-Mar	6	Cardiovascular	Week 1	Foundation	2 weeks	**1 hour introductory tutorial plus (tentative) "Meet an Expert" session.**
13-Mar	7	Cardiovascular	Week 2			1 hour Challenger virtual mission (two separate groups)
20-Mar	8	Cardiovascular	Week 3	Cardiovascular	4 weeks	1 hr tutorial/Debrief
27-Mar	9	Cardiovascular	Week 4			1 hour "Meet an Expert"
3-Apr	10	intersession week	intersession week	intersession week	intersession week	
10-Apr		mid-term break	mid-term break	mid-term break	mid-term break	
17-Apr	11	Respiratory	Week 5	Cardiovascular	4 weeks	
24-Apr	12	Respiratory	Week 6			
1-May	13	Respiratory	Week 7	Respiratory	2 weeks	1 hr tutorial/Debrief
8-May	14	Respiratory	Week 8			1 hour "Meet an Expert"
15-May	15	GIT	Week 9	GIT	3 weeks	**1 hour tutorial plus (tentative) "Meet an Expert" session.**
22-May	16	GIT	Week 10			AsMA meeting week (New Orleans)
29-May	17	GIT	Week 11			*(Group videos due on 04 June)*
5-Jun	18	intersession week	intersession week	intersession week	intersession week	
12-Jun		mid-year break	mid-year break	mid-year break	mid-year break	
19-Jun						
26-Jun		student conference	student conference	student conference	student conference	
3-Jul	19	Renal	Week 12	Metabolism and Immunity	4 weeks	1 hr tutorial/Debrief
10-Jul	20	Renal	Week 13			1 hour "Meet an Expert"
17-Jul	21	Endocrine	Week 14			LEGO Build to Launch Tutorial 1
24-Jul	22	Endocrine	Week 15			
31-Jul	23	Metabolism	Week 16	Musculoskeletal (Renal and Locomotor)	4 weeks	1 hr tutorial/Debrief
7-Aug	24	Metabolism	Week 17			1 hour "Meet an Expert"
14-Aug	25	Locomotor	Week 18			
21-Aug	26	Locomotor	Week 19			LEGO Build to Launch Tutorial 2
28-Aug	27	intersession week	intersession week	intersession week	intersession week	
4-Sep	28	Neuroscience	Week 20	Neuroscience	3 weeks	1 hr tutorial/Debrief
11-Sep	29	Neuroscience	Week 21			1 hour "Meet an Expert"
18-Sep	30	Neuroscience	Week 22			*(Written assignments due on 24 September)*
25-Sep		mid-term break	mid-term break	mid-term break	mid-term break	
2-Oct	31	Neuroscience	Week 23	Reproduction	2 weeks	1 hr tutorial/Debrief/'Expert' session (RC) *(ePortfolio due 08 October)*
9-Oct	32	Neuroscience	Week 24			ePortfolio presentation session + 'wrap-up'
16-Oct	33	Reproduction				
23-Oct	34	Reproduction				
30-Oct	35	Reproduction				
6-Nov	36	Summary Week				
13-Nov		Examination Period				
20-Nov		Examination Period				
27-Nov		Examination Period				
4-Dec						
11-Dec						
18-Dec						
25-Dec						

‘Special extras’





During the course of each block, it is a key mission objective to reflect on the translational research aspects and/or "spinoffs" which have, or may be, used to improve the health of people here on Earth, and for you to record a short reflection on this in your ePortfolio.

‘Special extras’

WELCOME | MISSION OUTCOMES | MEET YOUR CREW | REQUIREMENTS | SCHEDULE | UNIFORM | HEALTH

Any recorded 'Meet an Expert' sessions will be available to download from this folder. The password is **Space_2022***


MISSION COMMANDER: Dr Rowena Christiansen


EXPERT GUEST: Dr Jon French


EXPERT GUEST: Dr George Pantalos


EXPERT GUEST: Dr Mark Melin


EXPERT GUEST: Professor Kim Prisk


EXPERT GUEST: Kristine Atienza

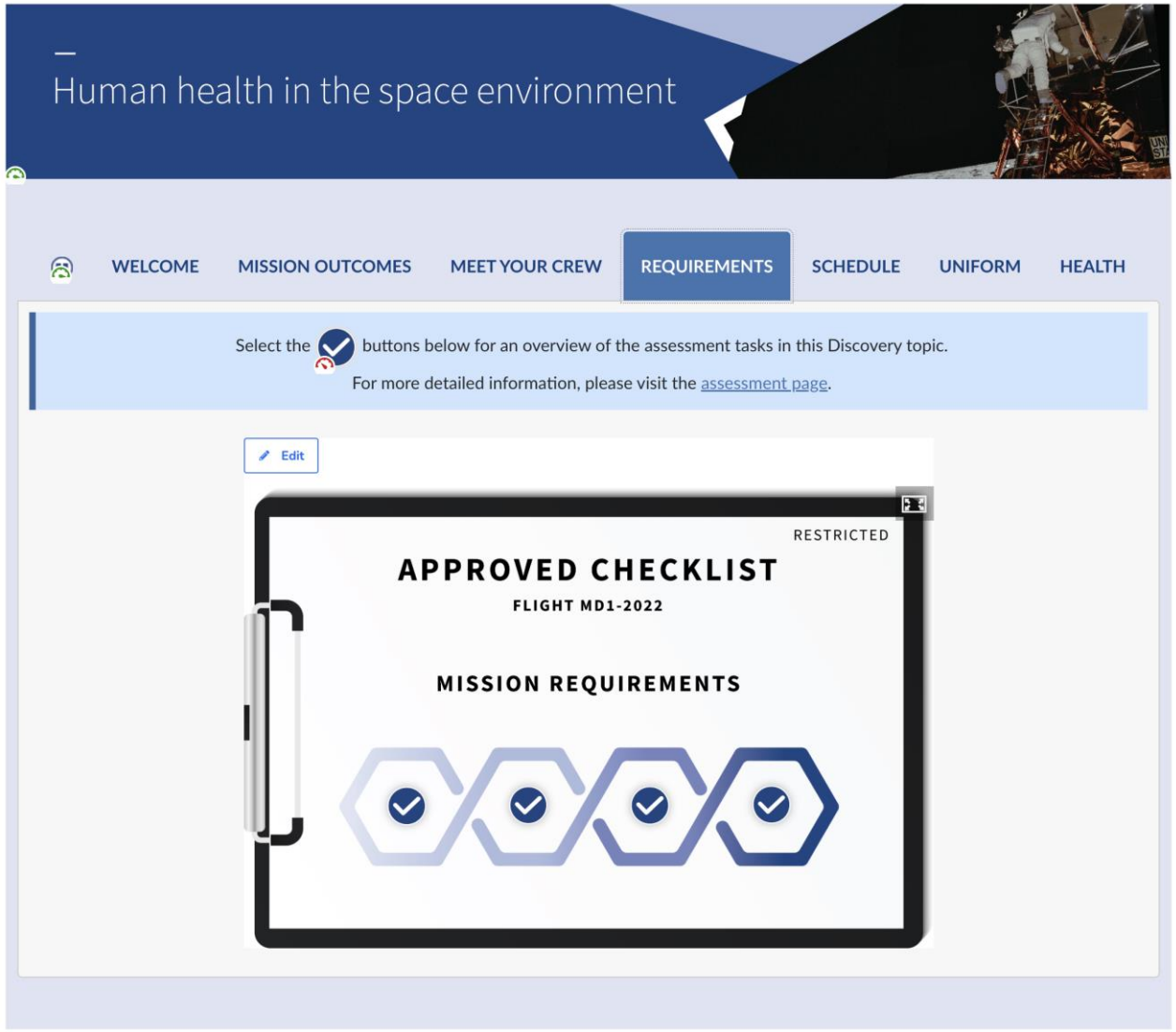

EXPERT GUEST: Professor Julie Hides


EXPERT GUEST: Dr Mallika Sarma


EXPERT GUEST: Dr Mark J. Rosenberg

2022 TRAINEE SPACE PHYSICIANS

Assessment tasks



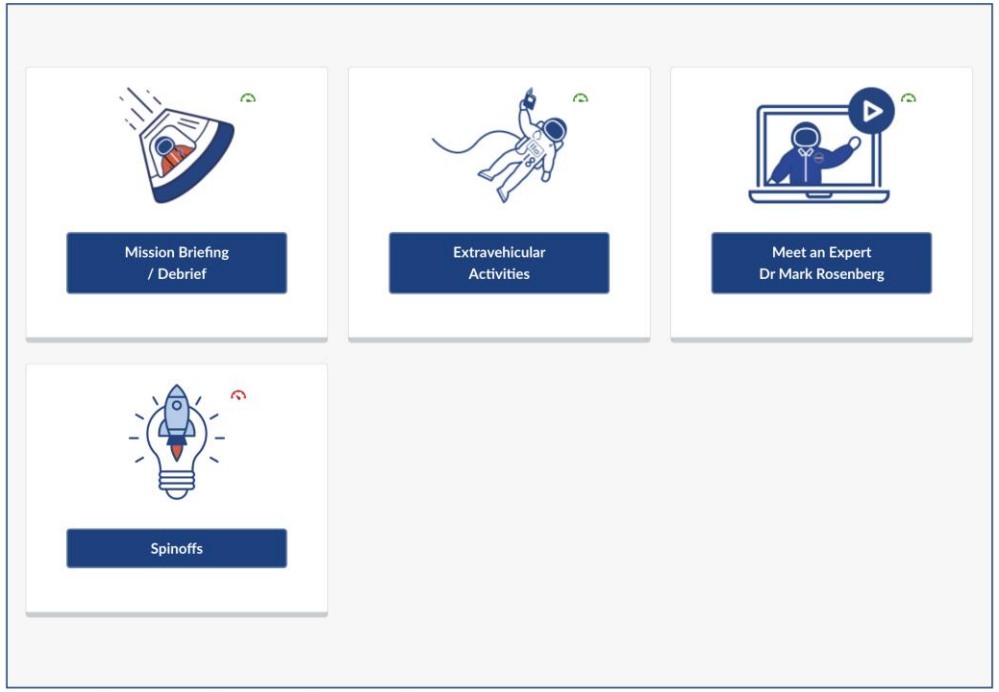
Assessment description	Assessment word count	Timing	Weighting
1. Oral presentation or equivalent	10 minutes by individual, 15 minutes by pair or 20 mins by three-person group = 1000 words	No more than halfway through the subject	20%
2. Written report/s and/or written examinations, or equivalent	Max 3000 words or 3 hours of examination or combination thereof	Between mid and end of subject	60%
3. ePortfolio reflective piece	1000 words	End of subject	20% Hurdle
4. Professional behaviour	All MD students must abide by the course Professional behaviour guidelines		Hurdle

1. Group video production (20 minutes): *Learning about 'humans in space' - science communication to inspire others* (based on one of the Semester 1 blocks).
2. Written article on *'Humans in space': past lessons, current challenges, and countermeasures* (3,000 words).
3. ePortfolio presentation (10 minutes) using 'Spinoffs': *In translation: how learning about health in space can help health on Earth ("Space4Health").*

All tasks are designed to be pitched at an accessible level for members of the general public.

Students have the opportunity to submit their presentations to an annual space health conference.

Key Dates – Neuroscience Block



- **Mission Briefing/Debrief:** Wednesday 14 September 2022 @ 10:00
- **Meet an Expert: Dr Mark Rosenberg** Wednesday 21 September 2022 @ 10:00
- Written Report due on **Sunday 18 September**
- Submission of ePortfolio Reflective Piece 'Spin-off' presentation due on **Sunday 02 October**
- Individual presentations (as per schedule) on **Monday 03 October** and **Wednesday 05 October**

Neuroscience Block

The human brain and behaviour in space

START HERE | SPACEWALK AIMS | EXPLORE | DISCUSS | EXTRA RESOURCES

"I may say that this is the greatest factor: the way in which the expedition is equipped, the way in which every difficulty is foreseen, and precautions taken for meeting or avoiding it. Victory awaits him who has everything in order, luck, people call it. Defeat is certain for him who has neglected to take the necessary precautions in time, this is called bad luck." (Roald Amundsen)

Neuroscience Block

The human brain and behaviour in space

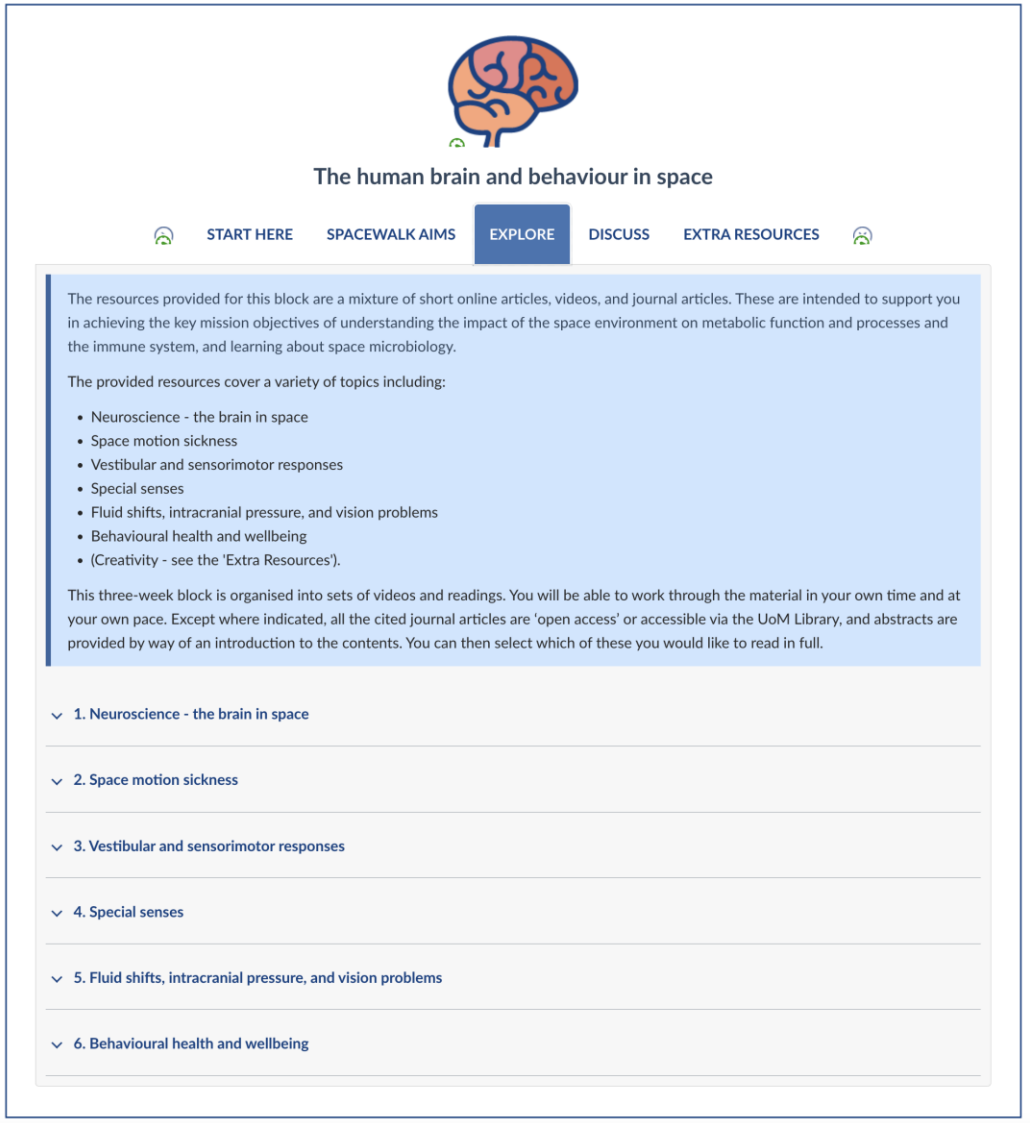
START HERE | SPACEWALK AIMS | EXPLORE | DISCUSS | EXTRA RESOURCES

Learning outcomes for Spacewalk: The human brain and behaviour in space

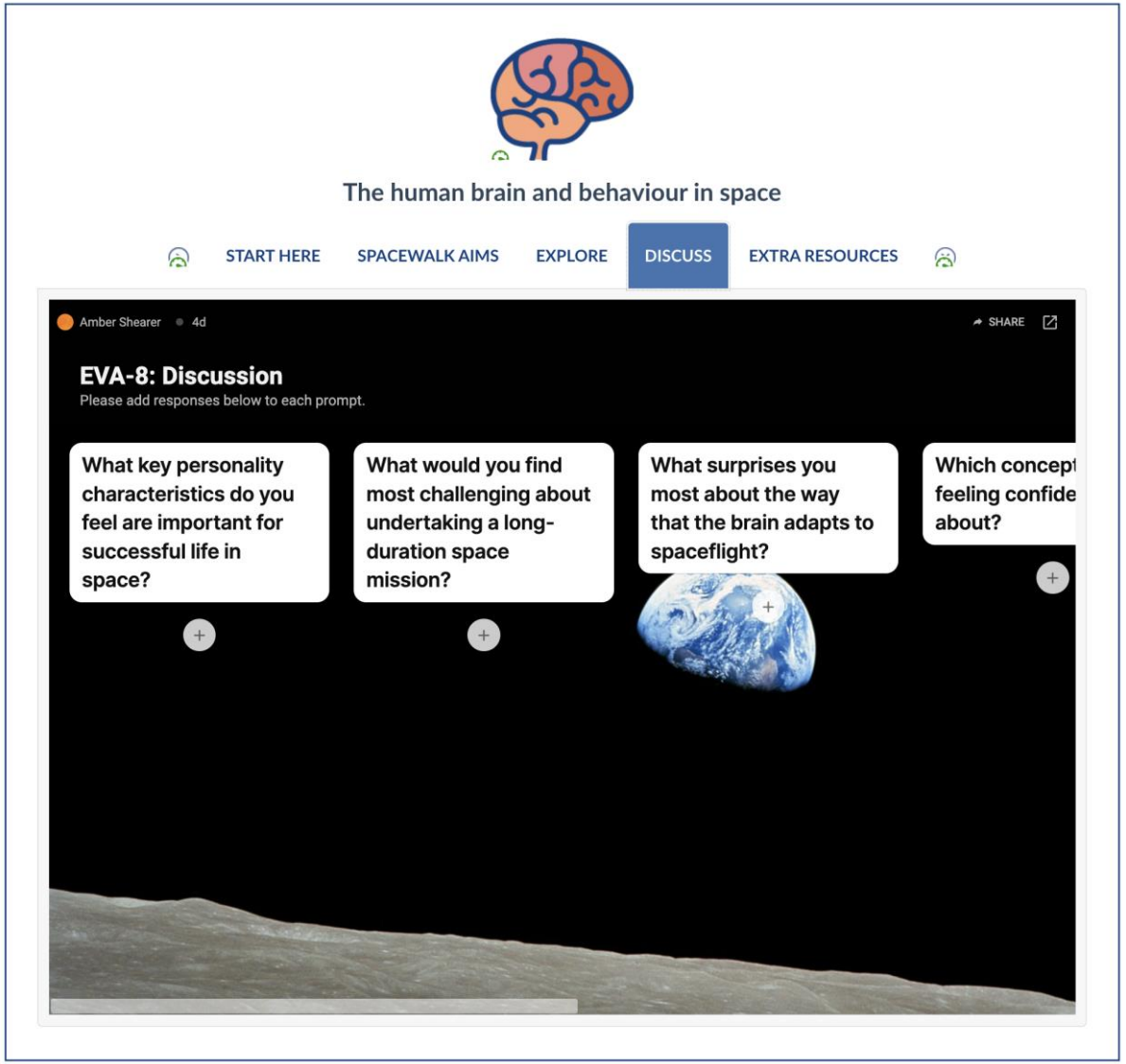
Please ensure you tick off these aims as you work through the content in this spacewalk:

- [ ] Appreciate the key neurological effects of spaceflight
- [ ] Understand why space motion sickness occurs and how it manifests itself
- [ ] Appreciate how spaceflight affects the vestibular system and the implications of this
- [ ] Be aware of the impact of spaceflight on all the 'special senses'
- [ ] Appreciate the fluid shifts and changes in intracranial pressure that occur in microgravity
- [ ] Be able to identify the key characteristics of spaceflight-associated neuro-ocular syndrome (SANS)
- [ ] Understand the key issues in behavioural health and wellbeing during spaceflight
- [ ] Appreciate that creativity might be an important survival skill.

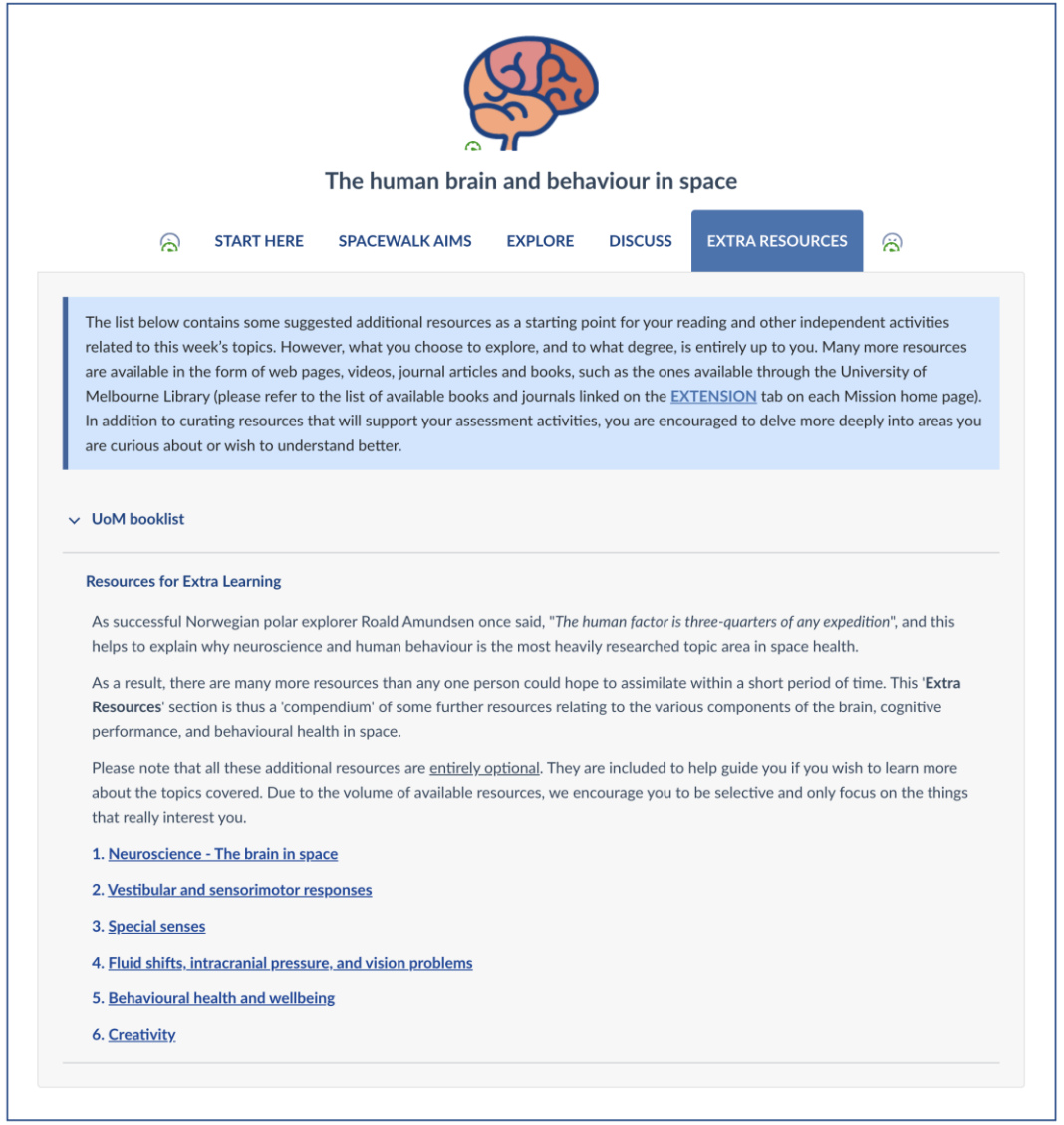
Neuroscience Block



Neuroscience Block



Neuroscience Block



The human brain and behaviour in space

START HERE | SPACEWALK AIMS | EXPLORE | DISCUSS | EXTRA RESOURCES

The list below contains some suggested additional resources as a starting point for your reading and other independent activities related to this week's topics. However, what you choose to explore, and to what degree, is entirely up to you. Many more resources are available in the form of web pages, videos, journal articles and books, such as the ones available through the University of Melbourne Library (please refer to the list of available books and journals linked on the EXTENSION tab on each Mission home page). In addition to curating resources that will support your assessment activities, you are encouraged to delve more deeply into areas you are curious about or wish to understand better.

UoM booklist

Resources for Extra Learning

As successful Norwegian polar explorer Roald Amundsen once said, "*The human factor is three-quarters of any expedition*", and this helps to explain why neuroscience and human behaviour is the most heavily researched topic area in space health.

As a result, there are many more resources than any one person could hope to assimilate within a short period of time. This '**Extra Resources**' section is thus a 'compendium' of some further resources relating to the various components of the brain, cognitive performance, and behavioural health in space.

Please note that all these additional resources are entirely optional. They are included to help guide you if you wish to learn more about the topics covered. Due to the volume of available resources, we encourage you to be selective and only focus on the things that really interest you.

1. Neuroscience - The brain in space
2. Vestibular and sensorimotor responses
3. Special senses
4. Fluid shifts, intracranial pressure, and vision problems
5. Behavioural health and wellbeing
6. Creativity

Small group discussion (four groups)

You will have an opportunity to work together in breakout rooms to discuss the following three questions (on Canvas under ‘Pre-Tutorial Tasks’).

Please read the instructions carefully. Each group will need to select a representative to report back to the main group (*your ‘Zoom room’ group number appears at the top of the screen*).

Discussion point 1: The ‘biophilia hypothesis’

In this article, Neilson, B. N., Craig, C. M., Altman, G. C., Travis, A. T., Vance, J. A., & Klein, M. I. (2021). **Can the Biophilia Hypothesis Be Applied to Long-Duration Human Space Flight? A Mini-Review**. *Frontiers in psychology*, 12, 703766. https://doi.org/10.3389/fpsyg.2021.703766 (Links to an external site.), Neilson et al. state: "… *our modern life has created a deficit of nature, and it is presently unknown the long-term impact that this may have on us. A theory called biophilia (Wilson, 1984) suggests that humans have an innate propensity for nature, and there may be an evolutionary benefit to such a propensity. A large body of empirical research has supported the notion that being in natural environments compared to urbanized environments has a breadth of psychological benefits (see Berto, 2014, for review). Thus, a disconnection from nature may have a real and profound impact on our overall well-being*."

Discuss the 'biophilia' hypothesis - do you feel this applies to your own experience of life on Earth, and how might it affect humans in space?

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Discussion point 2: Coping with isolation and confinement

We have all had the experience of isolation and confinement during the coronavirus pandemic. What are your top five coping strategies that helped you get through this difficult time? Bring your list along to share with your small group, and then decide your 'top five' between you.

Use this Padlet to record your group’s strategies (*check your ‘Zoom Room’ number at the top of the breakout room screen*): https://unimelb.padlet.org/rowenachristiansen1/gx2vmeq0nq2p2ju3.

25 + 15

Small group discussion (four groups)

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Please read the instructions carefully. Each group will need to select a representative to report back to the main group (*your ‘Zoom room’ group number appears at the top of the screen*).

Discussion point 3: Can creativity help you to survive?

Creativity and 'brainstorming' ability are important problem-solving skills. One commentator recently said "*I actually believe creative thinking to be a survival skill, and in long-term space it will link clearly to notions of performance, risk and failure*".

Discuss amongst your group whether or not you agree with this statement, and why.

25 + 15

Mission Debrief –Metabolism and Immunity Block

To prepare for the 'Mission Debrief' segment, please reflect on the Block (‘**Metabolism and Immunity Mission**') you have just completed, and bring along some simple points to share in the session, together with any questions you might have.

- What did you **enjoy most** about the Metabolism and Immunity Mission?
- What did you **enjoy least** about the Metabolism and Immunity Mission?
- What do you think could be **improved** about the Metabolism and Immunity Mission?

For any points relating to the latter two, please bring along some constructive suggestions.

Any questions?

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Thank you