



PoSSUM Professional Certificate in Applied Astronautics

The PoSSUM Professional Credential in Applied Astronautics is a 21-credit immersive professional program focusing on aeronomy, bioastronautics, mission design, operations, and science education.

CURRICULUM

CORE CLASSES:

- AST 101: Advanced PoSSUM Academy (3 credits, J. Reimuller)
- BIO 102: Spacecraft Egress and Rescue Operations (3 credits, J. Reimuller)
- EDU 101: Fundamentals of Citizen Science and Research Methods(2 credits, U. Horodyskyj)

PICK TWO RESEARCH CONCENTRATIONS

Aeronomy

- AER 101: Suborbital Space Environment (2 credits, A. Kleinboehl)
- AER 103: Airborne Remote Sensing of Noctilucent Clouds (3 credits, J. Reimuller)

Bioastronautics

- BIO 101: Spaceflight Physiology (2 credits, E. Seedhouse)
- BIO 103: Microgravity Spacesuit Evaluation (3 credits, A. Persad and L. Kennick)

Science Education

- EDU 102: Spacesuit and Simulator Technician Qualification Course (2 credits, N. Moiseev, C. Nguyen)
- EDU 104: Sci-Arts and Science Communication (1 credit, J. McPhee)
- AER 102: Celestial Mechanics (2 credits, TBD)

Extravehicular Activity

- EVA 101: Space Medicine and Extreme Environments (2 credits, S. Pandya)
- EVA 102: Fundamentals of Saturation Diving and EVA Operations (3 credits, TBD)

PLUS ONE ADVANCED RESEARCH ELECTIVE:

- BIO 104: Advanced Egress – Spacesuit Post-Landing Testing (3 credits, J. Reimuller)
- EVA 103: Lunar and Martian Geology and Analog EVA (3 credits, U. Horodyskyj and J. Hurtado)
- EVA 104: Underwater EVA Suit Operations (3 credits, TBD)
- EVA 105: Life Support Systems (3 credits, E. Seedhouse)

AER 101: Suborbital Space Environment (2 credits)

Course Description: AER 101 provides an understanding of the general properties and characteristics of the geospace environment and the underlying physical mechanisms. The student will understand the fundamentals of aeronomy, study of the atmospheric environment of the mesosphere and lower thermosphere (MLT) region of the atmosphere. Special emphasis is given to the environmental hazards most relevant to the operations of manned spacecraft, including particles and radiation, impact phenomena, spacecraft charging, aerodynamic drag, and oxygen corrosion of surfaces.

Next Class: 5 February to 10 April, 2018

Location: Virtual

Prerequisites: AST 101

Instructor: Various

AER 103: Airborne Remote Sensing of Noctilucent Clouds (3 credits)

Course Description: AER 103 provides a foundation in flight research. Students will learn how to integrate and test imagery systems to aircraft and then organize operational field campaigns and sorties using PoSSUM research aircraft to study noctilucent clouds in annual field campaigns based from High Level, AB. Students will train for one of two in-flight roles: navigator or instrument operator. Students will also participate in coordinated ground observation campaigns to facilitate tomographic reconstruction of airborne images. Students will learn to operate at high-altitudes (up to 23K') in unpressurized aircraft. Transportation to High Level is organized from Edmonton, AB.

Next Class: June 22-30, 2017 (plus three weeks of webinars)

Location: High Level, Alberta

Prerequisites: AST 101

Instructor: J. Reimuller

BIO 101: Advanced Spaceflight Physiology (2 credits)

Course Description: BIO 101 covers the unique aspects of health maintenance of individuals exposed to the rigors of spaceflight. An overview of the physiological changes resulting from prolonged exposures to weightlessness and the establishment of countermeasures are presented in this course as with an understanding of the methods currently in use to mitigate these changes.

Next Class: July 1 – August 31, 2017

Location: Virtual

Prerequisites: AST 101

Instructor: E. Seedhouse

BIO 102: Spacecraft Egress and Rescue Operations (3 credits)

Course Description: Offered in partnership with Survival Systems USA in Groton, CT., BIO 102 is the first professional education course on the landing and post-landing phase of manned spacecraft missions. This course covers nominal and contingency landing scenarios, post-landing planning, rescue and recovery architecture design, egress systems and operational procedures, deconditioning and post-landing survivability, generalized egress skills, and emergency egress bottle use.

Next Class: April 3-7, 2017 (plus three weeks of webinars)

Location: Groton, CT.

Instructor: J. Reimuller

BIO 103: Microgravity Spacesuit Evaluation (3 credits)

Course Description: BIO 103 provides a foundation in the microgravity environment, microgravity research campaign planning and operations, human factors and spacesuit evaluation research, biomedical monitoring systems, science communication and public outreach. Students will evaluate prototype seat concepts, suit/seat interface, the umbilical interface, and ingress and egress procedures.

Next Class: 2-5 October, 2017 (plus four weeks of webinar-based instruction)

Location: Ottawa, Ontario

Instructors: A. Persad and E. Kennick

EVA 101: Space Medicine and Extreme Environments (2 credits)

Course Description: EVA 101 course participants will learn about space medicine, human performance, pre-, post-, and intra-flight medical and physiological considerations and conditions specific to the suborbital spaceflight environment. The course will dedicate a special focus to extreme environment medicine, research and analogue environments, and how they inform space medicine. The on-site portion of this class will focus on wilderness medicine and survival in extreme environments, culminating with a 3.5 day survival trek. Topics covered include, but are not limited to, physiology, countermeasures, rehab, nutrition, psychology, resilience, teamwork and leadership.

Next Class: September 9-16, 2017

Location: Montrose, CO.

Prerequisites: Basic and Advanced First Aid. NOTE: The practical component of this class will include a significant outdoor component. Participants will need to be medically cleared by their physician to take part and should expect to partake in strenuous physical activity. A suggested gear list will be sent out well in advance of the course.

Instructor: S. Pandya

EVA 103: Lunar and Martian Geology and Analog EVA (3 credits)

Course Description: EVA 103 will instruct the student how to sample and measure soil, water, and volcanic rock properties in a unique terrain on Earth that serves as an excellent analog to Mars. As the air gets thinner and thinner, you'll gain an appreciation for working in difficult and dusty conditions, similar to what astronauts may someday experience on Mars. We incorporate EVA spacesuit technologies and tools as might be used to do actual Martian science.

Next Class: TBD

Location: TBD

Prerequisites: AST 101

Instructor: U. Horodyskyj and J. Hurtado

EVA 105: Life Support Systems (3 credits)

Course Description: EVA 105 provides a background over the fundamentals of ecology, spacecraft life support systems, the extraterrestrial environment, the fundamental requirements of life support systems, Physico-chemical Life Support Systems, and Bioregenerative Life Support Systems.

Next Class: TBD
Location: Virtual
Prerequisites: AST 101
Instructors: E. Seedhouse

EDU 101: Fundamentals of Citizen Science and Research Methods (2 credits)

Course Description: This one-week course held in the foothills of Boulder, Colorado, USA teaches candidates about how to conduct scientific research in the field by immersing them in the process with a professional scientist. Candidates will learn how to structure research projects: from experimental design, to determining sample types and sizes, to qualitative and quantitative methods. They will also learn about assumptions and observations; error, uncertainty, precision and accuracy in data collection; how to take good field notes, test hypotheses, choose the right tools for the research, and how to analyze and interpret data.

Next Class: November 4-8, 2017
Location: Boulder, CO.
Prerequisites: AST 101
Instructor: U. Horodyskyj

EDU 104: Sci-Arts and Science Communication (1 credit)

Course Description: In collaboration with the SciArt Exchange, PoSSUM is including STEAM (Science-Technology-Engineering- Art-Math) engagement training coincident with April PoSSUM Scientist-Astronaut classes. Students will receive information about the principles of using art to engage about space and apply learned principles in a hands-on activity to produce a space artwork. The best artwork of any media format will be included in the SciArt Events planned for the last day.

Next Class: April 7-10, 2017
Location: Embry-Riddle Aeronautical University, Daytona Beach, FL.
Prerequisites: none
Instructors: J. McPhee