

MS in Medical Physiology
Area of Concentration in Aerospace Physiology (AOC in AP)
Resident and/or Online

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Definition of Aerospace Physiology

Aerospace physiology is the study of the physical and cognitive impact of an extreme and/or austere environment upon an individual. Those studies provide the foundation to develop strategies conferring mental and physical resilience against extreme environmental conditions, thereby optimizing performance of the aerospace traveler.

Need

The rapidly emerging aerospace and space tourism industry is enabling “tourists” to travel to suborbital locations, the International Space Station, and potentially, the “Artemis” Moon base, Mars and beyond. Sponsors of those projects range from government agencies such as NASA, the FAA and the European Space agency, to private industries which include Virgin Galactic, Space-X, to the US Space Force, Air Force, Navy and Marines.

Those commercial (civilian) space tourism industries, as well as the rapidly expanding federal and military aero- and space initiatives are hampered by an absence of scientists, physicians, educators and physiologists with first-hand experience of high-performance aviation. There is especially a dearth of physicians and scientists who have experienced both the physical challenges of aerospace aviation (hyper- and hypo- gravity, supersonic speeds, etc.) as well as subsequent outcomes. This creates a significant void in trained personnel; a void that we in the Department of Physiology & Biophysics are uniquely poised to fill.

Departmental Strength in Aerospace Physiology

Five of our primary departmental faculty in the CWRU Center for Aerospace Physiology (Dr. Michael Decker – Director, Dr. Lisa Damato, Dr. Joe LaManna, Dr. Jessica Taylor, and Dr. Kui Xu.)

<https://physiology.case.edu/research/centers/center-for-aerospace-physiology/>

have been identified by NASA, NATO, the US Air Force, and US Navy as both aerospace scientists and educators who are already training graduate students, military civilian and enlisted personnel in the core concepts of aerospace physiology. Four students have already received either funded summer or year-long fellowships from federal funding sources. Federal agencies currently fund a significant volume of aerospace-related research within the Department of Physiology & Biophysics. In addition, a series of focus groups conducted with future stakeholders, over the past 12 months, has created interest and enthusiasm for an aerospace physiology-focused program.

Stakeholders/Career Opportunities

- Physician Careers

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- Civilian- Government Physician (Aerospace Medicine)
- Aerospace Medicine Specialist Physician (Air National Guard, USAF, USN, NASA)
- Research Physiologist Careers
 - NASA Human Research Program
 - Navy Research Physiologist
- Department of Transportation--Federal Aviation Administration
 - Medical Examiner
 - Aerospace & Environmental Physiology research team
- Commercial space companies
 - Virgin Galactic Research coordinator
 - SpaceX—medical support
- Aerospace Operational Physiologist (USAF, USN)

Program Description:

The AOC in AP is available to both resident and online MSMP students who have completed their first year of core MSMP courses. All courses (including the Aerospace Physiology Journal Club) are offered in a synchronous, lecture/small group format for resident students and both live broadcast and asynchronously from recordings over the Internet for online students. The resident and online courses are exactly the same, with exactly the same content, quizzes, exams, and grading standards. Students are free to mix and match how they engage the program, all or part of the program being resident or online.

All students in the AOC in AP program must satisfy all the requirements of the MS in Medical Physiology program to earn the MSMP degree. For all MSMP students, the degree will officially be “MS in Medical Physiology” but students can indicate, and the Aerospace Physiology Administration Committee will acknowledge in all correspondence and letters of recommendation, that the student has completed an Area of Concentration in Aerospace Physiology.

Application Process for the AOC in AP program:

By the last day of April following their first year of study, MSMP students interested in the AOC in AP must:

1. Be in good academic standing; i.e. have a GPA greater than or equal to 3.0 (to earn the MSMP degree, students **must** have a final GPA in the program GREATER than 3.0);
2. Have passed the 1st year Comprehensive Examination over the two first year Medical Physiology courses;
3. Provide an excellent statement to the Director of the AOC in AP program explaining why they want to be part of this AOC. This statement should be sent to Dr. Nosek at:
Thomas.Nosek@Case.edu
4. Receive a favorable recommendation from their Academic Advisor sent to Dr. Nosek.

The Aerospace Physiology Administration Committee (APAC) will evaluate all student petitions to enter the program and decide who will be admitted to the program.

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AOC in AP Curriculum

Year 2 of the MSMP program - after completing the core physiology courses:

All students in the AOC in AP program must complete at least 12 hours of elective courses which must include:

1. Two courses chosen from the 2 Clinical Reasoning courses (PHOL 489 and 492) and the 2 Physiological Basis of Disease courses (PHOL 402A and 402B)
2. **Either** the Exercise Physiology (PHOL 487) course Fall semester **or** the Sleep Physiology course (PHOL 614) Spring semester.
3. The Independent Study in Physiology course (PHOL 451) where students write a 30-page review paper on a topic in Aerospace Physiology under the direction of their AP advisor. Dr. Nosek will assign each student in the AOC in AP program an AP advisor when they are accepted into the program.
4. Participation in the Aerospace Physiology Journal Club both Fall and Spring semesters. This is a 0 credit hour Journal Club.

Students who choose to take Exercise Physiology as one of their required electives:

Fall Semester:

1. Exercise Physiology (PHOL 487) – 3 credit hours
2. Choose one course from Clinical Reasoning I (PHOL 479) or Physiological Basis of Disease I (PHOL 402A) – 3 credit hours
3. Participation in the Aerospace Physiology Journal Club

Spring Semester:

1. Choose one course from Clinical Reasoning II (PHOL 492) or Physiological Basis of Disease II (PHOL 402B) – 3 credit hours
2. Independent Study in Physiology (PHOL 451) - 3 credit hours
3. Participation in the Aerospace Physiology Journal Club

Students who choose to take Sleep Physiology as one of their required electives:

Fall Semester:

1. Choose one course from Clinical Reasoning I (PHOL 479) or Physiological Basis of Disease I (PHOL 402A) – 3 credit hours
2. Independent Study in Physiology (PHOL 451) - 3 credit hours
3. Participation in the Aerospace Physiology Journal Club

Spring Semester:

1. Choose one course from Clinical Reasoning II (PHOL 492) or Physiological Basis of Disease II (PHOL 402B) – 3 credit hours
2. Sleep Physiology (PHOL 614) – 3 credit hours
3. Participation in the Aerospace Physiology Journal Club

Aerospace Physiology Journal Club

All students in the AOC in Aerospace Physiology will actively participate in the Aerospace Physiology Journal Club both Fall and Spring semesters. Students in the AOC will present recent

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papers that are seminal for the understanding of Aerospace Physiology. Papers will be chosen by the Director of the Journal Club, Dr. Jessica Taylor. All students in the AOC are expected to have read the papers and be prepared to discuss them at the meeting of the Journal Club. The Journal Club will meet 5 times fall semester (twice in September and October and once in November) and 5 times spring semester (twice in February and March and once in April).

Administration Committee:

Dr. Walter F. Boron is the Chair of the Department of Physiology and Biophysics. He has charged the Aerospace Physiology Administration Committee (APAC) with the responsibility of designing and administering the AOC in AP.

Members of the committee are:

1. Dr. Thomas M. Nosek, Chair
2. Dr. Michael Decker
3. Dr. Lisa Damato
4. Dr. Joe LaManna
5. Dr. Corey Smith
6. Dr. Jessica Taylor
7. Dr. Kingman Strohl