

College: Boonshoft School of Medicine

Department: Community Health

Academic Programs Reviewed

Division of Aerospace Medicine – Master’s Degree Program

Program Review Committee

Dr. Dean Olson Program Director

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Submitted: 1/15/2015

Department Chair: Dr. James Ebert

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Division of Aerospace Medicine Residency Program and Master of Science Program

Enrollment and Graduate History **Data in PED**

	Fall 09	Fall 2010	Fall 2011	Fall 2012	Fall 2013
Enrollment	4	8	6	19	17
Graduates	4	2	4	9	1

Program description

Aerospace Medicine (ASM) is the preventive medicine specialty that promotes the health and functional well-being of pilots, astronauts and other flight crew members as well as all other people traveling in air or space. ASM physicians endeavor to discover, prevent and manage various adverse physiological responses of the normal healthy individual to the hostile aerospace environment, such as the effects of low barometric pressures and oxygen tension, rapid and sustained acceleration, short and long-term effects of microgravity, cosmic radiation and isolation. Common medical problems associated with exposures to this abnormal environment include hypoxia, decompression sickness, ebullism, barotitis, spatial disorientation, G-induced loss of consciousness, circadian disturbances, thermal stress, space adaptation syndrome and microgravity induced bone-loss. Operationally, ASM specialists are involved with crew health, development of life-support systems, patient transport, and are integral to aircraft/spacecraft operations and accident investigations. Aerospace medical certification of pilots, astronauts and other flight crew members is also an important part of the practice of this specialty. These are some of the conditions, environmental factors, and medical issues that we focus on during the education of our students.

Our program is funded by an educational grant from NASA. It is the oldest civilian ASM training program in the United States. Two educational programs reside within our division: a Residency in Aerospace Medicine program and a Master of Science in Aerospace Medicine program. Incoming residents are required to be US citizens whereas the Master's students may be internationals. Residents are required to complete the MS in Aerospace Medicine Degree for graduation. Since its inception in 1978, the program has graduated physicians from around the world (including individuals from Australia, Brazil, Canada, China, Colombia, Germany, Greece, India, Israel, Japan, Jordan, Kuwait, Mexico, Pakistan, Portugal, Qatar, Republic of Congo, South Africa, South Korea, Saudi Arabia, Singapore, Taiwan, Thailand, United Arab Emirates and the United States of America). Our graduates hold high-ranking positions of responsibility in their individual countries.

Included in the resident's training are rotations at key government facilities. These include: NASA Johnson Space Center, NASA Kennedy Space Center, the Federal Aviation Administration Civil Aerospace Medical Institute, Wright Patterson Air Force Base.

The ASM residency program is fully accredited by the Accreditation Council for Graduate Medical Education. The Division of Aerospace Medicine provides all of the mandated training requirements for board eligibility for certification in ASM by the American Board of Preventive Medicine (ABPM). Graduates also earn a Master of Science degree in Aerospace Medicine

The Division of Aerospace Medicine's mission is to provide an ACGME fully accredited educational environment suited and conducive to promoting clinical and scientific inquiry, along with the skills, knowledge and competencies necessary to be a successful aerospace medicine practitioner.

Alignment with university mission, strategic plan

Vision & Mission Statements

Our Vision

"To progress as a preeminent community-based medical school that advances new models of academic excellence and community health care."

Our Mission

"To educate culturally diverse students to become excellent physicians, by focusing on generalist training that is integrated, supported, and strengthened by specialists and researchers, all of whom value patient-focused care, community service, and research, and have passion for improving health in their communities."

In respect to the values and mission of The WSU BSOM: the Division of Aerospace Medicine program embodies this mission as a provider of physicians who care for the great number of people impacted by the aerospace environments on a daily basis. The Division's reach is global and touches everyone who travels by air. Through our graduates working in the aviation and space industry, our Division is having a daily impact on safety and wellness of millions of people worldwide. Our training program is inherently diverse and supports basic training and research.

Program distinctiveness

1. Direct relationship with NASA through an educational grant
2. Educational training spans multiple fields of science and medicine, including, but not limited to aerospace engineering, flight training and piloting skills, atmospheric sciences, orbital mechanics, hyper and hypobarics, and government regulations.
3. Oldest civilian Aerospace Medicine training program in the United States
4. The only Aerospace Medicine Residency Program that offers a Master Degree in Aerospace Medicine where training takes place in-house.
5. Directly supports the federal airspace of the United States by providing physicians who go on to work for NASA and the FAA. Our graduates hold high ranking positions within NASA and the FAA in areas that are focused on human health and operational safety.
6. Participates in nation building by educating foreign military flight surgeons and students for the purpose of improving their national airspace

Recognitions of quality of the program

We are highly regarded in the Aerospace Medicine community in several respects:

In 2014, we had ongoing collaborative research efforts and have had inquiries for future collaborative research:

- Federal Aviation Administration – One of our current graduate students is working as a visiting student at the Civil Aerospace Medical Institute in Oklahoma City, Ok performing aviation accident research.
- Republic of Korea Air Force (ROKAF) – An ongoing study addressing fighter pilot physiologic lab values as compared to the general military population
- United States Air Force/Air National Guard – An ongoing study addressing fighter pilot neck strain and potential counter measures
- University of Texas Medical Branch – Initial research is focusing on effects of noise and vibration on manned space vehicles in development for both NASA and commercial space flight vendors.
- Green County Combined Health District (GCCHD) – Residents have performed research studies in conjunction with the GCCHD epidemiologist.
- Inquiries for research collaboration has come from the Japanese Space Exploration Agency,

The quality of our program and focused educational experience is recognized internationally. Prospective students are choosing our program over other international training programs. The International Academy of Aviation and Space Medicine has established an educational scholarship providing \$20,000 USD for international students seeking training in Aerospace Medicine. Seventy five percent have chosen our program to provide their training.

The success of our graduates reflects the preparation they received within our educational program. Our graduates have been hired by and have assumed leadership positions in national and international organizations including, but not limited to: National Aeronautics and Space Administration, Federal Aviation Administration, National Transportation and Safety Board, United States Air Force, United States Navy, Japanese Space Exploration Agency, and the Republic of Korea Air Force.

Our faculty members have diverse backgrounds. All of our faculty members have completed medical residencies in multiple specialties.

Our program has maintained accreditation by the Accreditation Council for Graduate Medical Education (ACGME).

Program learning outcomes

The learning outcomes for the Division are centered on graduate pass rate for the American Board of Preventive Medicine – Aerospace Medicine certification exam.

Description of description of learning outcomes assessment program

The Accreditation Council for Graduate Medical Education (ACGME) has established a pass rate requirement for the board certification exam of:

At least 50% of those completing their education in the preceding five years must take the American Board of Preventive Medicine certifying examination. Seventy five percent of a program's graduates from the preceding five years who took the certifying examination for preventive medicine for the first time must have passed. In those programs having fewer than 10 graduates in the past five years, at least 75% of the 10 most recent graduates must have passed.

The Division has had less than 10 graduates in the past 5 years.

Summary of assessment findings for past five years

Year	Number of grads
2005	0
2006	2
2007	2
2008	0
2009	1
2010	1
2011	1
2012	2
2013	0
2014	2

Year	No. who passed ASM Boards (and year graduated)
2005	2 (1 graduate of 2001 and 1 graduate of 2003)
2006	1 (graduate of 2006)
2007	1 (graduate of 2000)
2008	1 (graduate of 2006 took AOBPM)
2009	0 took boards
2010	0 took boards
2011	1 passed (graduate of 2010)
2012	5 passed (graduates of 2007, 2009, 2011, and 2 from 2012)
2013	0 took boards
2014	2 passed (graduates of 2006 and 2014), 1 did not pass (graduate of 2014)

Major curricular changes since last review (or past five years)

1. *Master of Science in Aerospace Medicine*: Complete rewrite of entire MS program with creation of 13 new courses representing 72% of the curriculum and updating / restructuring of the remaining 5 courses. This didactic rebuilding process expanded the total semester hours required for graduation from 36 to 42 and represents the most comprehensive educational experience offered in the Division's history dating back to its inception in 1978.

2. *Division of Aerospace Medicine Flight Medicine Clinic:* Development, expansion, and integration of the Flight Medicine Clinic into the ASM residency program and utilization as an added educational opportunity for the newly created clinical rotation in Aerospace Medicine for medical students and external residents.
3. *Aerospace Medical Research and Collaborative Efforts:* June 2014 signified the first time in excess of 10 years that the Division of Aerospace Medicine had original research published in a peer-reviewed scientific journal. This accomplishment illustrates the revitalization of research endeavors within the Division by ASM faculty, residents, and MS students. Additionally, original collaborative research partnerships have been formed between the Division of ASM and the Aerospace Medicine community. These research partnerships offer unique educational opportunities in both aviation and space flight environments, and directly contribute to significant curricula improvements.
4. *Federal Aviation Administration (FAA) Advanced Aviation Training Device (Flight simulator):* Phased integration of the Division's Flight Simulator to meet newly minted ACGME training requirements for Aerospace Medicine residents and incorporation into the new MS curriculum. The WSU BSOM Division of Aerospace Medicine is the *only* ASM residency program to offer this capability in-house utilizing faculty who are board certified in Aerospace Medicine *and* are fully qualified FAA certificated flight instructors. *This capability does not exist in any other ASM residency program in the United States.*

Graduate placement data, employer satisfaction

We do not monitor employer satisfaction in an official manner.

If program has professional accreditation, attach most recent review findings and recommendations

In April, 2013, and internal review was performed in accordance with ACGME requirements. Please see the report emailed in conjunction with this review – file name: *ASM IR final report 04 11 13*

Departmental Summary

Note: data entered in **RED** text indicates data estimates from within our division. This data was not available through budget planning and resource analysis.

Faculty demographics **Data in ADS**

	2008	2009	2010	2011	2012
Full					
Associate	2	2	2	2	2
Assistant					1
Inst/Lect					
Total	2	2	2	2	3

Note: data not available in ADS

Staffing Summary

	2008	2009	2010	2011	2012
Unclassified					
Classified					
Total					

Note: data not available in ADS

Student/faculty ratio **Data in ADS**

	2008	2009	2010	2011	2012
Student FTE/Fac FTE	2.0	2.0	4.0	3.0	6.5

Note: data not available in ADS. Data entered is based on full time instructors only.

Average class size **Data in ADS**

	2010	2011	2012
Lecture	8	6	19
Lab only			
Lecture/Lab			

Note: data not available in ADS

Total of student data for all programs in unit **Data in PED**

	Fall 09	Fall 2010	Fall 2011	Fall 2012	Fall 2013
Enrollment	4	8	6	19	17
Graduates	2	4	9	1	12

Total courses taught and credit hours generated for unit Data in PED

	Fall 09	Fall 2010	Fall 2011	Fall 2012	Fall 2013
Undergraduate	NA	NA	NA	NA	NA
Graduate	17 courses 47 quarter hrs	19 courses 51 quarter hrs	19 courses 51 quarter hrs	12 courses 37 semester hrs	12 courses 37 semester hrs
Total	17/47	19/51	19/51	12/37	12/37

Note: data not available in PED

Course completions Data in ADS

	2008	2009	2010	2011	2012
Undergraduate	NA	NA	NA	NA	NA
Master's					

Note: data not available in ADS

Expense per student and revenue to expense ratio Data in ADS

	2008	2009	2010	2011	2012
Expense per student					
Rev/Expense					

Note: data not available in ADS

Research and External Funding Data in PED

	2008	2009	2010	2011	2012
External funding	\$655,292.39	\$556,947.23	\$655,465.33	\$607,987.66	\$217,710.56

Note: external funding through a NASA educational grant. Data based on government fiscal year. 2012 shows partial year worth of funding.

Future employment projections for discipline (to be provided to unit)

Not provided

Description of how unit programs and curricula are "mission critical" to the core Wright State educational experience

The Division of Aerospace Medicine ASM residency and Master of Science programs are "mission critical" to the core Wright State educational experience and directly reflect the vision, mission, and values as outlined in the 2013-2018 "Empower" Strategic Plan, as well as that of the Boonshoft School of Medicine Executive Committee. Both Division of Aerospace Medicine programs have been funded by an educational NASA grant since 1978 and are recognized as directly supporting the Federal Aviation Administration (FAA) U.S. Airspace System as well as "Nation Building" by training our international students to assume high ranking positions in the 30+ countries of origin who have received degrees in our specialty. Additionally, the Division of Aerospace Medicine trains physicians to become the next generation of specialists directly supporting current and future NASA manned missions to Low Earth Orbit and beyond, as well as emerging manned commercial spaceflight ventures. Recently, the Division has had a significant increase in active duty USAF Flight Surgeons receiving Master of Science degrees in

Aerospace Medicine and subsequently utilizing this education when assuming high level medical command assignments throughout the world.

Faculty accomplishments and recognitions

1. Two faculty members, Dr. Jarnot and Dr. Garrison, are active duty flight surgeons in the Ohio Air National Guard.
2. Dr. Garrison is triple board certified in Emergency Medicine, Hyperbaric Medicine, and Aerospace Medicine. Along with his flight training and certifications, he is extremely well poised to provide significant education
3. Dr. Garrison is a committee member of the Federation Aeronautique Internationale, the organization that monitors and records space and aviation world records.
4. Both Dr. Jarnot and Dr. Garrison are flight instructors. Their knowledge is invaluable for relating medical conditions to the flight environment. They also are able to provide flight training experience to our residents and masters students.
5. Dr. Olson holds a degree in Aerospace Engineering giving him a unique perspective when considering human factors and aircraft/spacecraft design.
6. Dr. Olson has recently had an original research article published in the journal Space, Aviation, and Environmental Medicine, the scientific journal for Aerospace Medicine. The article focuses on the types of injuries sustained by pilots in general aviation accidents.
7. Dr. Jarnot has been instrumental in improving the quality of incoming residents. The Division began a new medical student and resident rotation within the Division of Aerospace Medicine. Although all faculty participated, the majority of the work was performed by Dr. Jarnot. The rotation is held two times each year, in April and October, with the intent of aiding in the process of resident selection. The rotation has been run twice in 2014 with significant results: the next two residents entering our program in the summer of 2015 both participated in the rotation program. During the rotation, they had the opportunity to demonstrate their knowledge and work ethic. They both exhibited excellent qualities.
8. Dr. Garrison, Dr. Jarnot, and Dr. Olson are now designated as *Senior Aviation Medical Examiners* by the FAA. Having such designation provided an opportunity to not only increase the number of pilots / flight crew medically certificated in our Flight Medicine Clinic, but rather lay the foundation for becoming a regional referral center for pilots in the immediate six state region and beyond.

Capacity for growth of programs

The Division of Aerospace Medicine has significant goals for growth. In our Division we have two full time and one part time faculty members and one program coordinator. With 2.4 FTE faculty members and one coordinator, we are: running an MS program; running a residency program; teaching 4 to 5 classes each semester; collaborating, developing, advising, and running multiple research projects; operating a flight medicine clinic; administering out of state CME conferences; providing flight instruction; and working to develop new growth areas for the division. This does not encompass the full spectrum of our responsibilities.

Currently, multiple new aspects to our program have been developed and implemented or are in the process of development for future implementation. These programs are focused around the general idea of using our MS degree curriculum and Residency program in as many ways as possible. We view it

as an educational tool to be used in a universal fashion. As an example: we are developing, in conjunction with Wright Patterson AFB, a certificate program focused on the basics of aerospace medicine for foreign military flight surgeons who are attending classes at Wright Patterson AFB. Our certificate program would be piggy-backed onto our MS program classes and would be additional education for the visiting flight surgeons as well as additional income for the division.

Ultimately, the workload placed on our faculty is above average. In order for our program to expand, additional funding and staff would be required. Program development thus far has been focused on generating future income to enable expansion.

New program opportunities

New opportunities for our program are numerous. In some cases we have begun the development within these areas.

First, within the field of civilian critical care air transport, there is a void of graduate medical education programs. Although Emergency Medical Transport fellowships exist, none are heavily focused on critical care air transport. A proposal has been introduced to WSU administration as well as the ACGME/RRC as a new avenue for graduate medical education. Graduates of our program would become the next generation of authority on the subject. The introduction of this program would set Wright State University, Boonshoft School of Medicine apart from any other graduate medical education institutions currently in existence.

Second, in the area of midlevel care (advanced trained nurses and physician assistants), NASA has recently employed a physician assistant within the space medicine operations division at Johnson Space Center. This is a new development within the field. Traditionally, all healthcare providers hired by NASA for operational purposes have been physicians. Current efforts in our division have focused on allowing advanced trained nurses and physician assistant into our MS program (traditionally, we have only allowed MDs or DOs). This opens the field of study for midlevel providers and positions WSU at the forefront regarding midlevel education.

Third pertains to international residents. There have been requests from the international community to start a residency program for international residents in aerospace medicine. Within the division, there has been some initial exploration, but no solid plans and discussion has focused around an international fellowship.

Fourth, discussions have taken place concerning the creation of a program to provide aerospace training for Air National Guard physicians and other health care providers. Currently they have had options within the Air Force, but those options have been limited.

Proposals to enhance programs

The goal of the Division of Aerospace Medicine is to become a Department of Aerospace Medicine. It is felt that with support from the school, the development of the above programs can be established, additional faculty hired, and additional funds generated. With a limited faculty and staff, growth becomes a challenge.

