



THE UNIVERSITY OF ARIZONA
COLLEGE OF SCIENCE
Molecular & Cellular Biology

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March, 15, 2021

Dear fellow UGC members,

I am writing this letter as the UGC representative of the College of Science. I will be with the Policies Subcommittee on Tuesday, but I wanted you to have my perspective when reviewing the proposal for a B.S in Medicine from the College of Medicine. I have spoken with my colleagues in the College of Science and many have substantial concerns about the new major. In the application you already have, you may view a letter from Joyce Schroeder, Department Chair of Molecular and Cellular Department as well as a brief note from Rebecca Gomez, Associate Dean, Student Academic Success, College of Science. I will forward any additional letters as they become available to me.

Concerns regarding the new degree revolve around two issues.

First, the B.S. in medicine (in particular Emphasis 2) is duplicative to other pre-health majors on campus. Through existing majors, students can focus in different areas of science in preparation for health careers. Currently, in the College of Science, the Department of Ecology and Evolutionary Biology has 491 students with a B.S. in Biology with an Emphasis in Biomedical Sciences. The Department of Molecular and Cellular Biology has 512 students, typically about 45% of these intend to pursue a career in medicine. Some of these students (153) have added the Emphasis in Genetics and Human Health that this department started in Fall 2018. Other College of Science programs regularly train students for careers in healthcare, but do not have a specified pre-health emphasis, including the Departments of Neurosciences and Biochemistry. For example, a survey of recent graduates with a B.S. in Biochemistry suggests that 33% entered health fields, with the majority of these attending medical school. In the College of Medicine, the Physiology Department enrolls over 1, 500 students, the large majority of whom are pre-health. With many existing choices for pre-health majors, it does not make sense to develop a new major that will directly compete with existing majors. It is also important to note that significant resources were used over many years to build the infrastructure needed to adequately support UArizona pre-health students.

Second, there is significant concern that development of this new degree through the College of Medicine is not in students' best interest. Three of the five departments proposing the new major currently have no undergraduate majors. There is concern that these departments are not prepared to meet the challenge of retaining undergraduate students, particularly the diverse students that our university is dedicated to supporting. Further, the curriculum outlined is not well-designed to prepare students for specific health careers that are targeted by the new major. In general, these issues point to an overall weakness of the proposal with regards to preparing undergraduate students.

I expand further upon these issues in the list of specific concerns below (listed roughly in order of materials within the proposal).

1. The new major will not allow transfer students. This does not seem to be in line with efforts on campus to reach all Arizona students and diversity on our campus.



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2. Proposers suggest without evidence that there is an insufficient inflow of prepared undergraduates into medical school. This is loosely tied in the proposal to a national need for more health care professionals. Elsewhere in the proposal, it is stated that the COM receives 10,000 applications per year. The acceptance rate for the UA medical school is about 7%. It is unclear how increasing the capacity for training undergraduate students for medical school will address this problem. Would not an increase in the capacity for training of physicians better meet this need?
3. The B.S. in medicine aims to prepare students for multiple careers. However, these careers have wide-ranging requirements and pathways. For example, how does the current degree relate to students within our established pathways in nursing? The focus on “health care” positions in general is confusing and misleading.
4. The proposal states that the major will directly prepare students to enter the workforce as home health aides, physical therapist aids, phlebotomists, etc. These are not careers for which a 4-year degree is required. Why would students pay for a B.S. degree to enter one of these fields?
5. Emphasis 2, “Basis Medical Sciences” seems to be the pathway intended for pre-medical students. However, the plan listed here does not include all the coursework needed for a student to enter medical school. The major includes only the first semester of introductory biology (leaving out the accompanying lab). The major does not require calculus or genetics. The major does not require or recommend a basic course in cell biology. All of these are either required or recommended by most medical schools and are also important for students to have the required knowledge and skills to succeed on the MCAT exam. Existing pre-health majors are carefully designed so that students completing the major will have what is needed (knowledge, skills, and coursework) to apply for medical school.
6. An examination of the sample 4-year plan reveals a lack of 300 level courses (the last 4 semesters include only 400 level courses within the major). This may be because many of the suggested upper-division courses are currently offered within the COM as dual enrollment for undergraduate and graduate students. This again suggests a lack of emphasis on undergraduate education in the proposing departments.
7. The proposal suggests that a 1.0 FTE director will oversee this large new program. It is not stated who that director will be.
8. The Diversity and Inclusion section (page 52) lists some existing structures in the COM to address these needs in general. However, the proposal seems to be lacking any specific plans for support structures to recruit and retain underrepresented students. This is of particular concern given the lack of diversity in medicine and our mission as a Hispanic Serving Institution. Nationally, less than 6% of physicians identify as Hispanic. <https://www.aamc.org/data-reports/workforce/interactive-data/figure-18-percentage-all-active-physicians-race/ethnicity-2018>
9. The learning outcomes for the proposed major (page 49) are very broad and do not seem to be designed to ensure that students are prepared for medical school admissions, including the MCAT examination. By examining the MCAT requirements



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<https://students-residents.aamc.org/applying-medical-school/article/whats-mcat-exam/#cars> one can see that the learning outcomes of the BS in medicine are not well aligned. By contrast the existing major in Molecular and Cellular Biology is well suited to prepare students for this examination. A few sample MCAT requirements and aligned MCB degree learning outcomes are shown below.

MCAT: Foundational Concept 1

Biomolecules have unique properties that determine how they contribute to the structure and function of cells, and how they participate in the processes necessary to maintain life.

- Content Category 1B: Transmission of genetic information from the gene to the protein

MCB Learning Outcome: Explain the role of and mechanisms by which the genome and its products generate biological structures and phenotypes including human disease

MCAT: Skill 2. Scientific Reasoning and Problem-solving

- Reason about scientific principles, theories, and models.
- Analyzing and evaluating scientific explanations and predictions.

MCB Learning Outcome: Understand and/or build models that generate testable hypotheses about biological processes.

MCAT: Skill 4: Data-based Statistical Reasoning

- Interpret patterns in data presented in tables, figures, and graphs.
- Reasoning about data and drawing conclusions from them.

MCB Learning Outcome: Read and interpret primary scientific literature in cell and molecular biology, linking the experimental results to prior understanding of biological processes.

MCB Learning Outcome: Apply quantitative strategies to analyze and understand biological processes.

10. In her letter, Dr. Schroeder suggests that the new B.S will likely compete with existing programs for the same pool of students. In his response, Dr. Vanderah states that the goal of the new B.S. is to attract new students to UArizona. Plans are presented to advertise and market the program, but no data are presented in the proposal to suggest that the program will indeed reach a new pool of students.

I hope that the academic programs subcommittee, and full UGC, will seriously consider the outlined concerns with this proposal. Based on my previous work on the academic programs subcommittee, I know that you take your work seriously and dedicate considerable time to making sure new programs are in our students' best interest. By writing this letter, I do not wish to stall the progress of our great university. I understand that an innovative idea like a "B.S. in Medicine" might bring new students to UArizona. However, in my opinion a viable solution must ensure that existing programs are not gutted by competition with new programs and, most importantly, that new programs building on best practices and existing knowledge in an effort to do what is best for our students.

Sincerely,

Molly S. Bolger, Ph.D.

March 15, 2021

Dear Members of the Undergraduate Council,

We write this letter to express our unified objection to the proposal from the College of Medicine for a B.S. in Medicine. As you can see from the signatures at the end of the letter, we represent a significant number of the departments within the College of Science.

Through the process of shared governance, we have now all had the opportunity to review the proposal before your committee. Prior to now, many of us were not made aware of this proposal. We object to the B.S in medicine because of the damage that it will likely inflict upon our college and most importantly upon the students we serve.

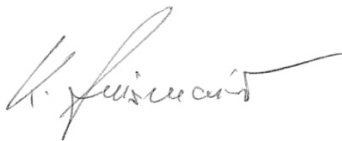
As a college we take our role in preparing pre-health students very seriously. Several of our departments directly prepare majors for careers in health care and the majority of our units play a role in educating students for careers in this area. We have appended a modified list of these careers to this letter[#].

We have spent decades refining our curricula, teaching methods and support structures to meet the needs of these students. We have great concern that the proposed B.S in Medicine will undermine the efforts by directly competing for enrollment with College of Science, as the CoS currently has 5814 students self-identifying as Pre-health. At a time in which we and our students are struggling to recover from a pandemic, we would like to see UArizona colleges work together, rather than creating redundant programs that work against each other.

We also share a concern that the proposed B.S. in Medicine major is not well-designed to meet students' needs. There are numerous issues that have been pointed out to you in other letters. Chief among these are a lack of coherence in a program attempting to serve diverse career paths and a lack of a demonstrated preparation to support the needs of diverse undergraduate students. Another concern raised by members of our community, but not included in previous letters, is that the proposed B.S. in Medicine does not represent good value for students and parents*.

As scientists, we are by nature enthusiastic about innovation. However, this proposed major carries with it undue harm to both our established majors as well as the students it proposes to educate. We urge you to oppose the creation of this redundant major that we fear will harm our students as well as the world-class departments in the College of Science.

Sincerely,



Konrad E. Zinsmaier
Professor and Interim-Head
Department of Neuroscience



Pélagie M. Beeson, Ph.D.
Professor and Head
Department of Speech, Language, and Hearing
Sciences



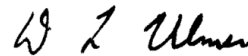
Michael Worobey
Professor and Head
Department of Ecology and Evolutionary Biology



Buell T. Jannuzi
Head, Department of Astronomy
&
Director, Steward Observatory



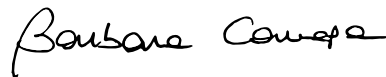
Lee Ryan, Ph.D.
Professor and Head,
Psychology Department
Assoc. Director, McKnight Brain Institute



Douglas Ulmer
Professor and Head
Department of Mathematics



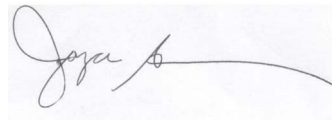
Thomas Meixner
Professor and Head,
Hydrology and Atmospheric
Sciences



Barbara Carrapa
Professor and Head
Department Head of Geosciences



Mary Peterson
Professor and Director
Cognitive Science Program



Joyce Schroeder
Professor and Head
Molecular and Cellular Biology



Timothy D. Swindle
Professor
Department Head and Director
Department of Planetary Sciences and Lunar and Planetary Laboratory



David Lowenthal
Professor and Interim Head
Department of Computer Science

Specifically, the Departments of Ecology and Evolutionary Biology, Molecular and Cellular Biology, Neurosciences, and Biochemistry play a significant role in educating future physicians, dentists, physical therapists, genetic counselors and other careers that require graduate training in addition to a solid background in science and mathematics. The Departments of Psychology and Speech, Language, and Hearing Sciences prepare majors including, but not limited to clinical researchers, physicians, nurses, healthcare administrators, healthcare analysis, health care workers for in-home services, senior living communities, and child/adolescent care facilities, health specialty teachers, occupational therapists, speech-language pathologists, and audiologists.

* One concern is that the “Basic Medical Sciences” track that many students will choose will not lead to competitive salaries for those who do not gain acceptance to medical school, in comparison to students graduating with a 4-year degree in science. Given the acceptance rate of 6.8% in the top 115 ranked U.S. medical programs (2018 U.S. News & World Report) we are concerned for those students who would earn a B. S. in Medicine degree, rather than a science degree. According to O*NET, of the occupations listed in the proposal for graduates with a BS in Medicine, all but medical and health services managers make \$44,000 or less and do not require a 4-year degree (range \$25,280 - \$44,000 for healthcare aid provider, physical therapist aid, occupational therapist aid, phlebotomist, medical records and health information technicians). Medical technologists require a 4-year degree and make \$49,850 annually but medical and health services managers with potential to earn annual salaries of \$100,980 require administrative training. The remaining occupations require additional graduate training. In contrast, students with BS degrees in the life sciences and chemistry earn annual salaries of \$65,000 and upwards (e.g., agricultural & food scientist \$65,160, environmental scientist and specialist \$71,360, microbiologist \$75,360, chemist \$77,630, bioinformatics scientist \$82,220).



THE UNIVERSITY OF ARIZONA
GRADUATE COLLEGE

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March 15, 2021

To the members of the Faculty Council,

I have had the opportunity to review the proposal to establish a BS in Medicine from the College of Medicine. I am deeply concerned that this proposal includes measures that would discriminate against diverse students and fails to include program supports aimed at including and retaining students from diverse backgrounds. Given our Hispanic Serving Institution status and the priority UArizona has given to retaining undergraduates, particularly those from diverse backgrounds, I would urge the Council to reject the proposal in its current form.

My perspective comes from my role as the Faculty Director for Diversity and Inclusion in the UArizona Graduate College and as one of the founders of Arizona Science Engineering and Math Scholars (ASEMS), a program for UArizona undergraduates that helps retain and graduate STEM majors from groups that are underrepresented in graduate and health care professional degrees. In addition, I am appointed as a tenured Professor in the Department of Molecular and Cellular Biology in the College of Science.

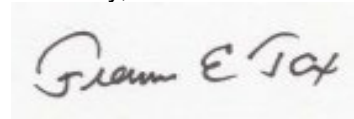
What follows are specific details of concern:

- 1) The BS in Medicine program will require a 3.0 GPA to be admitted to the program (p.1 of the proposal). This GPA requirement will have a disproportionately negative impact on the success of students from diverse backgrounds. Many UArizona freshman struggle in their first year or two but the number of DEW (D grade, E grade, W-withdrawal) in beginning STEM courses (Calculus, Chemistry) is much higher for first generation and/or high financial need students. Many of these students, who often come from Arizona's poorly performing public education system, may fall below a 3.0 for a semester, and thus would be ineligible to continue in the major. The proposal also stipulates that students cannot apply to be readmitted to the major (p.1). This will negatively impact retention. Should students earn sufficient grades to move their GPA above a 3.0 (as many do), they would not be eligible for readmission.
- 2) The BS in medicine will not accept transfer students into the program (p.1). Typically, transfer students are more diverse in their ethnicity than freshman, and more than 70% come from community colleges, who are more likely to be first generation college students or students with high financial need. It seems arbitrary and discriminatory to deny access to any UArizona major to transfer students.
- 3) The proposal fails to adequately describe program supports recognized as important to foster success in groups under-represented in health sciences (African American, Hispanic and Native American). Common program supports for inclusive programs typically include peer mentors, pathways to be involved in research early in their education, cohort building programs or classes, peer tutoring, and clubs and social programs that promote science identity. The proposal includes a brief mention of "student progress committees" but no explanation of what these are and how they function; the proposal mentions an overall "humanist" approach but fails to deliver on any specifics on how this approach will function to create a sense of belonging to diverse students that will positively affect their academic success.

It is important that we create programs and majors that are accessible to all motivated and interested students. A BS in Medicine would nominally be attractive to many diverse students, as medicine and human health are professions that enable students to find concrete ways to contribute to the welfare of their home communities.

It surprises me that a program with a plan to market to diverse students and their families fails to address retention issues and common academic barriers faced by these students.

Sincerely,

A handwritten signature in black ink on a light-colored background. The signature reads "Frans Tax" in a cursive, slightly slanted script.

Dr. Frans Tax
Faculty Director, Graduate College Office of Diversity and Inclusion and
Professor of Molecular and Cellular Biology
1007 E. Lowell.
Tucson, AZ 85721

March 15, 2021

The following letter and supporting documentation outline multiple concerns I have with the Bachelor of Science in Medicine. Namely, the proposed degree program is misrepresentative and misleading in that it does not provide students with the coursework, training, or credentials needed to enter many healthcare support careers or health professional programs upon completion. The proposed program fails to meet the basic educational requirements set by state licensing boards for careers or jobs such as 'massage practitioner', and falsely suggests that completing the program will qualify students to obtain vocational licenses without additional training or experience. Additionally, there are potential ABOR policy violations associated with this proposal that I would like to bring to the attention of review committees prior to their approval.

Please let me know if you have any questions regarding the attached points of concern and/or supporting documentation.

Sincerely,



Dr. Michael Worobey
Department Head
Louise Foucar Marshall Science Research Professor
Ecology and Evolutionary Biology



Points of Concern

- 1) **ABOR Policy 2-221** stipulates that an academic degree program is “identified by a specific degree title and a specific major subject matter area. The name of the major must reflect accurately the skills, competencies, and knowledge to be attained in the course of studies.”

The proposed degree is titled *Bachelor of Science in Medicine*, however the Classification of Instructional Programs (CIP) code provided in the proposal categorizes it as a *General Health Services/Allied Health/Health Sciences* (CIP 51.0000) program. In North America, the only awardable degree in Medicine is an MD, and the CIP code listing for Medicine (CIP 51.1201) specifies the title pertains exclusively to this degree-level and program.

▶ **Detail for CIP Code 51.0000**

Title: Health Services/Allied Health/Health Sciences, General

Definition: A general, introductory, undifferentiated, or joint program in health services occupations that prepares individuals for either entry into specialized training programs or for a variety of concentrations in the allied health area. Includes instruction in the basic sciences, research and clinical procedures, and aspects of the subject matter related to various health occupations.

IPEDS CIP: <https://nces.ed.gov/ipeds/cipcode/cipdetail.aspx?y=55&cipid=87605>

▶ **Detail for CIP Code 51.1201**

Title: Medicine (MD)

Definition: A program that prepares individuals for the independent professional practice of medicine, involving the prevention, diagnosis, and treatment of illnesses, injuries, and other disorders of the human body. Includes instruction in the basic medical sciences, clinical medicine, examination and diagnosis, patient communications, medical ethics and law, professional standards, and rotations in specialties such as internal medicine, surgery, pediatrics, obstetrics and gynecology, orthopedics, neurology, ophthalmology, radiology, clinical pathology, anesthesiology, family medicine, and psychiatry.

IPEDS CIP: <https://nces.ed.gov/ipeds/cipcode/cipdetail.aspx?y=55&cipid=88805>

The proposed Bachelor’s-level program in Medicine does not confer a professional health or medical degree, nor will it prepare students to practice professional medicine independently upon graduation. The required coursework and curriculum provide a general introduction to health services occupations and prepares students for entry into specialized (i.e. accredited) training programs in allied health. Therefore, an accurate name for the proposed major should instead align with its CIP code title that best reflects the skills and knowledge imparted by the program (i.e. Bachelor of Science in Health Services, Allied Health, etc.).

- 2) The proposed degree title also runs the risk of misleading international students, in particular UA Global students who start coursework abroad and intend to finish their degree in the US. It is common for institutions outside of the United States and Canada to award bachelor's degrees in medicine—typically ‘Bachelor of Medicine’ or ‘Bachelor of Medicine, Bachelor of Surgery’ degrees—which are professional degrees conferred upon completion of a graduate-level medical program and considered equivalent to a ‘Doctor of Medicine (MD)’ degree (and also a ‘Doctor of Osteopathic Medicine’ degree in the US).



- ▶ Bachelors degrees in medicine are currently awarded in institutions in 51 foreign countries, 21 of which host one or more UA Global Microcampuses (**Table 1**).
 - ▶ Google search results for “Bachelor in Medicine” indicate that bachelors degrees in medicine are offered only in institutions outside of North America (**Table 2**).
 - ▶ **ECFMG Medical Education Credentials Guide:** <https://www.ecfm.org/certification/reference-guide.html>
- 3)** According to **ABOR Policy 2-223** all new academic programs must be approved by UA governing committees and ABOR before the program may be publically announced. In violation of this policy, the Bachelor of Science in Medicine is already advertised on UA Global’s website as a Major option under the Health Sciences degree path.
- ▶ **UA Global, Health Sciences – Potential Majors:** <https://everywhere.arizona.edu/health-sciences>
- 4)** The proposal inaccurately states that "students graduating from the program will be well-prepared to enter advanced degree programs in Human Medical and Health Sciences" and "a BS in Medicine along with advanced doctoral degree and licensure will allow students to enter into careers such as: Physical Therapists (DPT), Medical Physician (MD or DO), Professor (PhD), Pharmacists (PharmD), Dentist (DDS), Podiatrist (DPM), Optometrist (OD), Nurse Practitioners (DNP)."

Major requirements for the degree program exclude many courses required for admission to professional health programs (**Table 3**). Extensive supplemental coursework and/or an additional undergraduate degree would be required for a BS Medicine graduate to qualify for admission to multiple of the programs listed.

- ▶ Under the “Program Comparisons” section of the proposal, ASU’s Bachelor of Science in Medical Sciences is listed as a peer program for comparison. The ASU program contains all prerequisite courses for admission to health professional programs, whereas the proposed UA BS Medicine program does not.

ASU Medical Studies (BS) – Major Map:

<https://webapp4.asu.edu/programs/t5/roadmaps/ASU00/NHMEDBS/null/ALL/2020?init=false&nopassive=true>

- 5)** The proposal states that the BS in Medicine “along with advanced certification and/or a Master’s degree” will allow students to enter into ~30 health services careers, however the degree doesn’t provide the minimum educational requirements necessary for admission to most advanced healthcare services degree programs (**Table 4**), nor will graduates of the program be eligible to sit for many of the certification exams required to practice or pursue careers in allied health. Approximately two-thirds of the healthcare services careers listed in the proposal would require additional education or training, such as a postsecondary non-degree award (1-year) or Associate’s degree (2-years) from an institution with a specialized or programmatic accreditation (**Table 5**).
- ▶ The “ABOR Requirement” section of the proposal indicates that no specialized accreditations will be sought for the program. However, University of Arizona has only two accreditations that are applicable to the proposed BS in Medicine program: an institutional accreditation from the Higher Learning Commission (HLC), and specialized/programmatic accreditation in Perfusion.
- CHEA Accreditation UA:** <https://www.chea.org/university-arizona>



Table 1. Countries with insitutions that grant bachelor's degrees in medicine.

*** UA Global Microcampus location**

*Australia	Hong Kong	Myanmar	*Malaysia
Bahrain	*India	*Nepal	*Sri Lanka
*Bangladesh	*Iraq	New Zealand	Sudan
Barbados	*Ireland	*Nigeria	Tanzania
Botswana	Jamaica	*Pakistan	Trinidad and Tobago
*Brazil	*Jordan	Papua New Guinea	Uganda
Colombia	Kenya	*Philippines	Ukraine
*China	Kuwait	Samoa	*United Arab Emirates
*Egypt	Lebanon	Saint Kitts and Nevis	*United Kingdom
Fiji	Libya	*Saudi Arabia	Vanuatu
*Gambia	Malawi	Sierra Leone	Zambia
Ghana	Malaysia	Singapore	*Zimbabwe
Guyana	*Mauritius	South Africa	

ECFMG Reference Guide for Medical Education Credentials:

<https://www.ecfm.org/certification/reference-guide.html>

Table 2. Google search results for "Bachelor in Medicine"

<p>University of Oradea, Romania</p> <p>Universitas Gadjah Mada, Indonesia</p> <p>Ualikhhanov University, Kazakhstan</p> <p>University of Morón, Brazil</p> <p>Batterjee Medical College, Saudi Arabia</p> <p>Universidade Cidade de São Paulo, Brazil</p> <p>Brunel University London, United Kingdom</p> <p>Queen Mary University of London, Malta</p> <p>International Medical University, Malaysia</p> <p>University of Bologna, Italy</p> <p>University of Birmingham, United Kingdom</p> <p>Lakshveer Overseas Solution, Malaysia</p> <p>Mkhitar Gosh Armenian-Russian International University, Armenia</p>
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HealthCareStudies:

<https://www.healthcarestudies.com/Bachelor/Medicine/>

Educations.com:

<https://www.educations.com/search/bachelors-degree-medicine?q=Bachelor%20in%20Medicine>

TABLE 3. Professional health program prerequisite courses excluded from BS Medicine major requirements

Professional Health Program	Prereq Courses Excluded	Program Admission Requirements
Dentist (DDS)	MCB 181L, ECOL 182R, ECOL 182L, CHEM 241B, CHEM 243B, PHYS 103 & 182 or PHYS 241, MIC 205A, MIC 205L	https://thecenter.arizona.edu/pre-health/pre-dentistry
Medical Physician (MD or DO)	MCB 181L, ECOL 182R, ECOL 182L, CHEM 241B, CHEM 243B, PHYS 103 & 182 or PHYS 241	https://thecenter.arizona.edu/pre-health/pre-medicine
Nurse Practitioners (DNP)	FSHD 117 or FSHD/EDP/PSY 200, MIC 205A, NSC 170 or NSC 101 or NSC 310	https://www.nursing.arizona.edu/academics/doctor-nursing-practice-dnp/admissions
Optometrist (OD)	MCB 181L, ECOL 182R, ECOL 182L, CHEM 241B, CHEM 243B, PHYS 103 & 182 or PHYS 241, MIC 205A, MIC 205L	https://thecenter.arizona.edu/pre-health/pre-optometry
Pharmacist (PharmD)	MCB 181L, ECOL 182R, ECOL 182L, CHEM 241B, CHEM 243B, MIC 205A, MIC 205L, ECON 200, COMM 119	https://thecenter.arizona.edu/pre-health/pre-pharmacy
Physical Therapist (DPT)	MCB 181L, ECOL 182R, ECOL 182L, MIC 205A, MIC 205L, PSY 150A1 or PSY 101, PSY 200, PSY 381, PHYS 103 & 182 or PHYS 241	https://thecenter.arizona.edu/pre-health/pre-physical-therapy
Podiatrist (DPM)	MCB 181L, ECOL 182R, ECOL 182L, CHEM 241B, CHEM 243B, PHYS 103 & 182 or PHYS 241	https://thecenter.arizona.edu/pre-health/pre-podiatry
Professor (PhD)	Coursework likely not sufficient for admission to most PhD programs	NA

TABLE 4. Advanced healthcare services program prerequisite courses excluded from BS Medicine major requirements

Healthcare Services Program	Prereq Courses Excluded	Program Admission Requirements
Occupational therapist (OT)	PSY 150A1 or PSY 101, PSY 200, PSY 381; additional 3-6 Semester Hours Each of Sociology, Anthropology, Humanities, and Medical Terminology.	https://thecenter.arizona.edu/pre-health/pre-occupational-therapy
Nurse anesthetist, nurse midwife, & nurse practitioner (APRN)	FSHD 117 or FSHD/EDP/PSY 200, MIC 205A, NSC 170 or NSC 101 or NSC 310. Minimum score of 75 on HESI Admissions Assessment Exam.	https://www.nursing.arizona.edu/mepn-admissions
Nurse Practitioner (BSN)	FSHD 117 or FSHD/EDP/PSY 200, MIC 205A, NSC 170 or NSC 101 or NSC 310	https://www.nursing.arizona.edu/bsn
Physician Assistant (PA)	MCB 181L, ECOL 182R, ECOL 182L, MIC 205A, MIC 205L, PSY 150A1 or PSY 101, PSY 200, PSY 381; additional 30-40 units of Biology, Chemistry, and/or Physics required for some programs.	https://thecenter.arizona.edu/pre-health/pre-physician-assistant

TABLE 5. Healthcare services careers that require a degree or postsecondary non-degree award from an accredited institution in order to be eligible to apply for professional certification/licensure

Career	Degree/Award Required	Program Duration	Accrediting Agency	Requirements to Practice
Dental Hygienist	Associate's Degree	2 yrs	CODA	https://www.medicaltechnologyschools.com/dental-hygienist
Diagnostic Medical Sonographer	Associate's Degree	2 yrs	CAAHEP	https://www.medicaltechnologyschools.com/ultrasound-technician
Health Information Technician	Postsecondary nondegree award	1 yr	AHIIM	https://www.medicaltechnologyschools.com/health-information-technology
Licensed Practical and Vocational Nurse (LPN, LVN)	Postsecondary nondegree award	1 yr	CCNE	https://www.bls.gov/ooh/healthcare/licensed-practical-and-licensed-vocational-nurses.htm
Radiation Therapist	Associate's degree	2 yrs	AART, JRCERT	https://www.medicaltechnologyschools.com/radiation-therapist
Radiologic Technologist	Associate's Degree	2 yrs	AART, JRCERT	https://www.medicaltechnologyschools.com/radiologic-technologist
Medical and Clinical Laboratory Technician	Associate's Degree	2 yrs	NAACLS, ABHES	https://www.medicaltechnologyschools.com/medical-lab-technician/mlt-ascp-certification
MRI Technologist	Associate's Degree	2 yrs	AART, JRCERT	https://www.medicaltechnologyschools.com/mri-technologist
Nuclear Medicine Technologist	Associate's Degree	2 yrs	JRCNMT	https://www.medicaltechnologyschools.com/nuclear-medicine-technologist
Physical Therapist Assistant	Associate's Degree	2 yrs	CAPTE	https://www.medicaltechnologyschools.com/physical-therapist-assistant
Occupational Therapy Assistant	Associate's Degree	2 yrs	AOTA	https://www.bls.gov/ooh/healthcare/occupational-therapy-assistants-and-aides.htm#tab-4
Paramedic	Associate's Degree	2 yrs	CoAEMSP	https://www.medicaltechnologyschools.com/emt
Respiratory Therapist	Associate's Degree	2 yrs	CAAHEP	https://www.medicaltechnologyschools.com/respiratory-therapist
Surgical Technologist	Postsecondary nondegree award	1 yr	CAAHEP	https://www.medicaltechnologyschools.com/surgical-technologist