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Final Report

The Role of Undergraduate Education in Communication Sciences and Disorders

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I. Introduction

Questions about the role of and models of undergraduate education have surfaced repeatedly over the years within both the American Speech-Language-Hearing Association (ASHA) and the Council of Academic Programs in Communication Sciences and Disorders (CAPCSD). Recent discussions of several groups (ASHA's Board of Directors Audiology Subcommittee [2013], ASHA's 2013 Academic Affairs Board [AAB], ASHA's 2013 Ad Hoc Committee on Interprofessional Education [IPE], ASHA's Ad Hoc Committee on Reframing the Professions, Special Interest Groups [SIGs] 10 and 11) and the CAPCSD conference proceedings (2008, 2009) indicate that now is the time to address these questions and issues due to emerging changes in health care, clinical practice, and higher education.

Charge to the Academic Affairs Board

The work of the groups listed above identified a need to examine the role and current models of CSD undergraduate education. In response, the ASHA Board of Directors (BOD) charged the AAB with examining the role and current models of CSD undergraduate education in the context of five different education perspectives/lenses. These perspectives/lenses included (1) speech-language pathology graduate-level education, (2) audiology graduate-level education, (3) interprofessional education, (4) the shortage of PhD-level faculty and researchers, and (5) support personnel. The objective was for the AAB to develop a report that would help determine whether changes to undergraduate education are necessary, provide specifics regarding changes that may be indicated, and identify steps for effecting change in undergraduate education models. The remainder of the report details the perspective and activities of the AAB in relation to the examination of undergraduate education in CSD.

Centrality of CSD Undergraduate Education

Human communication is the most complex skill we perform. Speech recognition requires sophisticated auditory and perceptual mechanisms. Speech production requires the rapid and precise coordination of articulatory gestures. These motor, linguistic, and perceptual activities take place under constraints of other cognitive processes and in social contexts with varying intentions and purposes. Hence, CSD departments should serve as important focal points on university campuses for faculty and students interested in advancing the science of human communication and disorders through research, management, technology, and advocacy. *ASHA's Envisioned Future: 2025* (ASHA, 2015) affirms that the discipline should play an "unparalleled role in advancing, sustaining, and promoting ... communication sciences and disorders, related functions, and methods of communications."

CSD in the Broader Context of Undergraduate Education

The undergraduate degree in CSD must be viewed within the broader context of bachelor's degree education in the United States. General education fundamentals are present in all bachelor's degrees, including such areas as critical thinking, quantitative reasoning, higher order reading and writing, and oral communication. In addition, many institutions explicitly declare that the development of values and increased ability to participate as an engaged citizen in a democracy are goals of their undergraduate programs. CSD disciplinary content is one means through which students achieve the objectives of a bachelor's degree, providing opportunities to hone general skills within a disciplinary environment in the context of a broad-based undergraduate education.

The study of human communication is at the heart of all CSD degree programs, from a perspective grounded in the biological, physical, mathematical, statistical, behavioral, and cognitive sciences. The field also draws from a rich history of association with educational foundations and inquiry. Thus, our discipline exposes students to important questions within an interdisciplinary framework. These questions have driven us to encompass knowledge, skills, and orientations of a diverse range of science and social science disciplines. As one of the disciplines preparing graduates in a STEM (science, technology, engineering, and mathematics) field, CSD is an important player in the preparation of individuals who have the ability to consider critical questions and contribute to key enterprises of the 21st century. Completion of a CSD degree will ensure that graduates have exposure to contemporary science and technology. This background will enable them to explore numerous career paths, having developed knowledge, skills, and aptitudes in both basic and applied science within a perspective linked to health sciences and education.

Variability in CSD Undergraduate Programs

Institutional mission and history vary among programs offering an undergraduate degree in CSD. This degree has historical links to the ideals of a broad-based education in the liberal arts and sciences, but not all existing degree programs have evolved from that tradition or are so conceived today. The division/college housing the major may range from liberal arts and sciences to education and health sciences. Some CSD programs may be embedded within another major; others may be stand-alone departments or schools. Institutions will have unique circumstances based on these histories, populations they serve, and visions for the role of the CSD major; curricula will reflect those differences. Despite these differences, there are fundamentals shared by all programs offering an undergraduate degree in CSD. The goal of this report is to elucidate the role of undergraduate education in CSD broadly and with respect to the five education perspectives identified by the BOD.

Growth of the Undergraduate CSD Degree

The degree has gained popularity in recent years as evidenced by data from the Communication Sciences and Disorders (CSD) Education Survey Data Reports (ASHA, 2014). In 2012–2013, out of 260 CSD undergraduate programs, 228 (87%) responded to a survey on undergraduate education. Total enrollment for undergraduates in CSD programs in 2012–2013 (extrapolated to 100% of programs reporting) reached 44,527 students. This represents a 28.6% increase over 2010–2011 enrollments (up from 34,620 total students in 2010–2011). There were 10,921 undergraduate degrees granted in CSD in 2012–2013, which is a 9% increase over the number of degrees granted in 2010–2011.

The increase in the size of undergraduate programs can be contrasted with the size of related graduate degree programs, which have shown less dramatic growth over the same time period. For example, master's programs in speech-language pathology reported a 12.9% increase in total enrollment (extrapolated to 100% of programs reporting) from 2010–2011 to 2012–2013 (from 15,150 students to 17,099 students). The total extrapolated number of students enrolled in clinical doctoral programs in audiology increased 4% from 2010–2011 to 2012–2013 (from 2480 students to 2579 students). Enrollment in PhD programs in speech, language, and hearing sciences increased 8.9% from 2010–2011 to 2012–2013 (from 897 students to 977 students). Clearly, many CSD undergraduates will not advance to graduate school in speech-language pathology or audiology or obtain research doctorates in speech, language, or hearing sciences. The disparity between the large increase in undergraduate enrollments and the modest increase in graduate enrollments reflects an evolution of the CSD bachelor's degree from more narrowly focused credential training for practitioners to a broad-based degree providing pathways to careers in fields such as health care, education, science, and public policy.

II. Activities of the AAB to Address the Charge

In April, 2014, the AAB began to consider the role of undergraduate education in CSD as it relates to (1) graduate entry-level clinical education in both audiology and speech-language pathology, (2) PhD education, (3) interprofessional education, and (4) support personnel preparation. The AAB conducted a number of activities from April 2014 to the present. Each will be described below.

First, the AAB reviewed numerous documents related to undergraduate education, including CAPCSD conference proceedings and policy documents—*The Future of Undergraduate Education* (Wilcox, 2008); *Models of Undergraduate Education* (Scudder, Aarts, Golper, & Gropher, 2009); relevant ASHA policy documents; *CSD Education Survey Data Reports* (academic years 2010–2011, 2011–2012, 2012–2013); 2007 SLP Education Summit and Audiology Education Summit (Mashie & Lucks Mendel, 2005). Over the summer and fall of 2014, the AAB reviewed the following sources in an effort to gain more information about the current state of undergraduate education: (a) undergraduate curricula from a cross section of CSD programs (including identifying prerequisites for students admitted to graduate programs who do hold CSD degrees) and (b) undergraduate requirements for other health-related professions. A summary of the findings can be found below.

A. Undergraduate Curriculum From a Cross Section of CSD Programs

A total of 86 institutions were randomly selected from 262 institutions offering a CSD major. The selected institutions were verified for geographic location, size, and program of studies. Of the selected schools, 35 offered a PhD degree, 52 programs offered an AuD degree, all but one program offered a master's degree in speech-language pathology, and all but three programs offered a bachelor's degree in CSD. Each of the programs was evaluated to determine the prerequisite courses (e.g., coursework in social science, physical science, math/statistics, English/writing)—in addition to CSD major coursework—for completion of the undergraduate degree and entry into the graduate programs in speech-language pathology and audiology.

A summary of the results examining prerequisites suggested that almost all speech-language pathology master's programs required social, behavioral, biological, and physical science "foundational" courses as well as basic human communication courses, such as phonetics, anatomy and physiology, speech and hearing science, and speech and language development. Most also required courses in basic audiology and/or aural rehabilitation and some form of a clinical methods course. Prerequisite CSD course credits ranged from 13 to 72 credits (mean = 42 credits, $n = 77$ institutions). A few programs failed to address the topic of students with non-CSD bachelor's degrees. Some academic programs required only five or six prerequisite courses; others simply required students to take all requirements for a CSD undergraduate major. For audiology, most programs had prerequisites that were the same as, or similar to, speech-language pathology programs, although a few imposed no prerequisites or had different requirements ($n = 28$).

The majority of institutions reviewed required specific courses in the foundational sciences, math, statistics, and writing/English. On average, institutions recommended 6–9 credit hours in physical sciences, with a few requiring as many as 19 credit hours. Higher level mathematics was recommended by many institutions with suggestions for trigonometry or other quantitative analysis courses (average of 3–9 credits hours). Social and behavioral sciences, including psychology and/or anthropology, were recommended by most institutions, with average course credits ranging from 6 to 9 hours. Moreover, some institutions provided recommendations for writing/English courses (6 credits on average). Additional elective courses were recommended by most institutions.

B. Undergraduate Requirements for Other Health Science Professions

Twelve health and education related professions were reviewed (see Appendix). Websites for professional organizations and professional training programs based at universities or professional schools were searched for information about undergraduate requirements. Of the 12 health-related professions reviewed, four (education, public health, rehabilitation science, and social work) had no clear undergraduate requirements other than a bachelor's degree. Of the eight professions that specified undergraduate requirements, all (except psychology) required one or more science courses. Professions with a limited-license physician (LLP) status—including doctors of optometry, chiropractic, and

dentistry—had a heavy science emphasis at the undergraduate level. Nurse-practitioner requirements were not reviewed.

Following these fact-finding activities, the AAB spent a considerable amount of time identifying and discussing knowledge, skills, and aptitudes; curriculum and coursework; and other educational experiences that would prepare a student for entry into graduate education in the professions. Specifically, the AAB considered how undergraduate programs prepared students for graduate-level clinical or PhD education in audiology or speech-language pathology or provided a strong base for pursuit of other careers.

The AAB recognizes that some CSD undergraduate programs currently prepare support personnel (i.e., audiology assistants, speech-language pathology assistants). However, most undergraduate CSD curricula do not. Therefore, the AAB recommends that available resources be dedicated to strengthening existing programs at the undergraduate and graduate levels, rather than expanding programs for preparing support personnel.

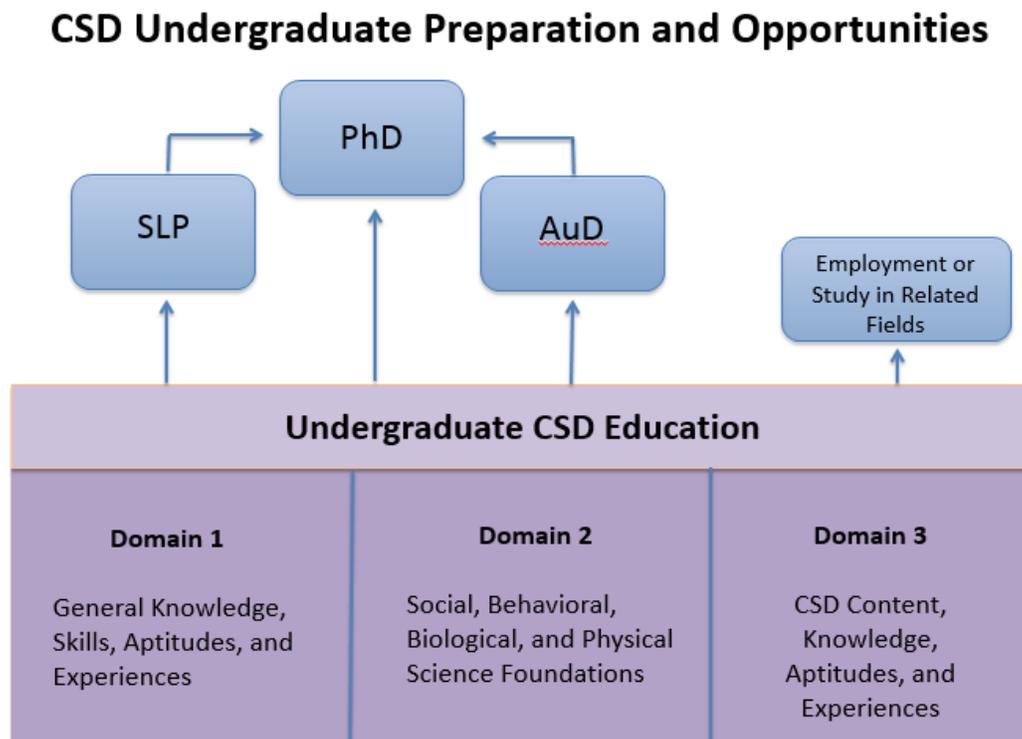
In addition, the AAB recommends that a focus on interprofessional education and opportunities for interdisciplinary collaboration be embedded throughout the undergraduate curriculum. Per *ASHA's Envisioned Future: 2025* (ASHA, 2015 in the words of the Institute of Medicine's Global Forum summary (2013), "Through the experience of learning with and from those in other professions, students also develop leadership qualities and respect for each other, which prepares them for work on teams and in settings where collaboration is a key to success."

Through the AAB's preceding activities, a list of knowledge, skills, aptitudes, and experiences was developed, revised, and categorized into three domains of undergraduate education:

- Domain 1: General Knowledge, Skills, Aptitudes, and Experiences
- Domain 2: Social, Behavioral, Biological, and Physical Science Foundations
- Domain 3: CSD Content Knowledge, Skills, Aptitudes, and Experiences

Figure 1 depicts a broad-based undergraduate education in CSD leading to four possible outcomes. Some graduates will be accepted into speech-language pathology and audiology programs. A portion of those students will then advance to PhD education. Undergraduate students will also be prepared to go directly into PhD programs (BS/PhD) or joint programs (e.g., MA/PhD, MS/PhD, AuD/PhD). Finally, a number of CSD undergraduates will enter graduate programs in related fields (e.g., psychology, public health, information sciences, neuroscience, special education) or will take a wide range of jobs.

Figure 1



Domains of Knowledge and Skills Associated With Undergraduate CSD Education

Domain 1—General Knowledge, Skills, Aptitudes, and Experiences

- Critical thinking, problem solving, logical reasoning skills
- Exposure to the scientific method and opportunities for research experiences
- Exposure to the culture of science (e.g., ethics, interdisciplinary, team science)
- Exposure to other disciplines and professional and scientific organizations
- Opportunities for interdisciplinary and interprofessional collaborative learning
- Exposure to “evidence-informed decision making” as a lifelong learning journey
- Cultural competence
- Competencies in oral and written communication (e.g., reading, writing, listening, speaking)

Domain 2–Social, Behavioral, Biological, and Physical Science Foundations

- Biology
- Human anatomy and physiology
- Linguistics
- Math and statistics
- Neuroscience
- Physics and acoustics
- Psychology and cognitive science
- Exposure to research contributions across fields

Domain 3–CSD Content Knowledge, Skills, Aptitudes, and Experiences

- Historical and philosophical tenets of the profession
- Normal communication (speech, language, hearing, cognition) across the lifespan
- Overview of hearing and balance disorders
- Overview of speech, language and swallowing disorders
- Overview of the clinical process, continuum of service delivery, and evidence-based practices
- Cocurricular experiences, such as grand rounds and colloquia, service learning, and undergraduate research
- Exposure to health and education policy and advocacy
- Knowledge of how to work in teams
- Knowledge of clinical, academic, and research careers, including faculty and graduate student research

Delivery Methods

In addition to content knowledge, skills, aptitudes, and experiences, the AAB also discussed current methods for delivery. Undergraduate education is clearly moving away from more traditional models of content delivery (e.g., lecture as the primary delivery mode) and toward a larger view of education as based in active learning, engagement, cocurricular experiences, and other high-impact learning practices. In some CSD programs, such experiences were formerly embedded in a clinical training emphasis—an approach that few programs embrace today.

Yet, most programs currently offer a rich array of engaged learning activities due to the interdisciplinary nature of the field, the strong potential for community service, and applied topics lending themselves to case-based teaching and learning. The scholarship of teaching and learning has evolved within the discipline, and there are CSD scholars investigating these areas and conferences devoted to disseminating research results and innovative methods.

For example, ASHA’s Special Interest Group 10, Issues in Higher Education has been developing ASHA Convention sessions and fostering [ASHA Community](#) discussions on newer pedagogies. In addition, the annual CAPCSD conference usually offers sessions on pedagogy and opportunities to share teaching resources. As we look to improve

undergraduate education, we find both curricular and cocurricular opportunities and a growing body of scholarly evidence and expertise in this area to draw on to enhance CSD students' experiences. CSD departments can promote problem-centered learning to foster independence in the pursuit of knowledge. They can also foster involvement in activities such as service learning and undergraduate research. Such approaches are needed to enhance undergraduate preparation for both graduate clinical as well as research degrees.

In addition, as undergraduate CSD programs move into the future, the challenge of serving increasing numbers of students and maximizing available resources may require the development of online courses. The scholarship of teaching and learning applies equally to online courses, as do the concepts of active learning, service learning, and case-based and problem-based learning and teaching. Consequently, faculty must continually update their knowledge and skills in these areas—including the use of advanced technology—through continuing education and by developing courses that differ from traditional lecture-based methods.

III. AAB Response to Additional Questions Raised by the ASHA BOD

The ASHA BOD charged the AAB with answering the following questions as part of the task of examining undergraduate CSD education. The AAB has responded to each question with ideas for influencing undergraduate education aimed toward each degree type.

1. How can we improve the preparation of undergraduate students for careers as speech-language pathologists?

To best prepare students for the clinical master's in speech-language pathology, the undergraduate degree in CSD should provide students with a broad-based foundation in the sciences and humanities, as well as fundamental knowledge of human communication, communication development, and the nature of communication disorders across the lifespan. An emphasis on excellence in science fundamentals, enhanced by seeing them through the lens of clinical concepts, will put the degree on the best footing to prepare undergraduates for superior performance in master's programs.

The AAB also emphasized that undergraduate degree programs in CSD can no longer afford to focus primarily on preprofessional education, because many of our undergraduates will be working in fields other than speech-language pathology. Undergraduate programs that provide students with greater depth and breadth in science and in the foundations of the discipline can prepare students for a wide variety of professions related to education, health care, communication, and human services. This should be done through an interdisciplinary curriculum that focuses on educating the whole person and not just training the specialist. Students should engage in problem-based learning that is relevant to their background, history, and goals. This approach overcomes the disadvantages of overspecialization by balancing knowledge of research with experiences that promote problem solving, creativity, communication skills, and cultural awareness. These skills will allow students to thrive in graduate school or in a wide variety of occupations. Outstanding undergraduate programs in CSD offer learning opportunities in three domains:

- General Knowledge, Skills, Aptitudes, and Experiences (Domain 1)
- Social, Behavioral, Biological, and Physical Science Foundations (Domain 2)
- CSD Content Knowledge, Skills, Aptitudes, and Experiences (Domain 3)

Within Domain 1, undergraduate students should have the opportunity to engage in a variety of active learning, interdisciplinary collaborative learning, and/or service learning experiences that foster the development of critical thinking, evidence-based problem solving, and logical reasoning skills. It is important for students to be exposed to the scientific method, and they should be provided with experiences that expose them to the culture of science, including an awareness of research ethics, interdisciplinary approaches to science, data collection, and data analysis.

Within Domain 2, undergraduate students should have a strong foundation of social, behavioral, physical, and cognitive science courses; mathematics and statistics courses; and humanities courses (including sociology, linguistics, and/or anthropology). Within Domain 3, students should receive courses that provide basic information about the nature of speech, language, and hearing processes and disorders in children and adults. This preparation will provide undergraduate students with greater depth and breadth in science and in the foundations of the discipline.

2. How can we improve the preparation of undergraduate students for careers as audiologists?

The undergraduate degree should have a firm basis in science and research concerning hearing and its translation to communication disorders. It has been well-established that those who go into audiology are drawn to empirically and technically based study. At the present time, many AuD programs admit students with diverse backgrounds from STEM, psychology, and even music. A necessary emphasis on (neuro) science, the research process, the evidence base, and quantitative analysis in the undergraduate program will be well-aligned to attract and prepare students for careers in audiology. Considering the areas listed in Domain 2, the undergraduate preparation moves forward to greater depth and breadth in science than had been the case historically.

3. How can we improve the preparation of undergraduate students to better motivate and prepare them for PhD careers in CSD?

There are many routes to engage and encourage students (both at the undergraduate and graduate levels) to pursue a PhD. For example, some students enter PhD programs immediately following completion of an undergraduate, master's, or clinical doctoral degree in speech-language pathology or the doctor of audiology degree. Other students pursue the PhD in parallel with another graduate degree or following a period of clinical practice. Given the current and projected shortage of PhD faculty and the current number of PhD graduates in CSD, it is critical that the pursuit of a PhD be made attractive and accessible to undergraduate students. There are many aspects of the PhD career path that may be emphasized, including scientific rigor/inquiry, career options, and career satisfaction.

Undergraduates (and graduates) considering a PhD should be offered enhanced research experiences and opportunities so that they can learn more about the process of scientific inquiry. In this way, students may become excited about the prospect of understanding and improving human communication within a culture of science and research. Through collaborative research activities, undergraduate students may see the importance of teamwork and learning from other professionals and disciplines. During their undergraduate programs, students can be made aware of the impact of research on individuals, families, systems, and policies.

In addition to exposure to scientific rigor and inquiry, undergraduate (and graduate) students should be made aware of the multiple career options available to individuals with a PhD in CSD. These career options include but are not limited to positions as university faculty and researchers; researchers outside of academia (e.g., industry, medical centers, research institutes); policy makers; clinical administrators; and/or combinations of these career options.

Finally, students should be made aware of the career satisfaction available to those with a PhD in CSD. In addition to demonstrating the professional components of PhD-level positions (teaching, research, service), the flexibility of daily scheduling; independence; opportunities for continuous learning; rewards of teaching and mentoring; and the potential of a rich, balanced, and fulfilling life outside the workplace can be made apparent to students. Sharing with students the personal and positive aspects of a PhD career path may be just as important as stressing the challenges and benefits of scientific rigor and inquiry.

4. How can interprofessional education be optimally and practically incorporated in undergraduate and graduate education?

Numerous factors are driving health care and education toward an increased need for collaborative and interdisciplinary practice. The ever-expanding knowledge base in health care and education necessitates greater emphasis on team-based approaches to service delivery. The rapidly evolving regulatory environment in health care and education is another factor, as professions are charged with ensuring best practices in using models of patient-centered care and implementation science. Interprofessional practice patterns must be founded on interprofessional education. An overall orientation to interprofessional experiences in health care and education and a team orientation to learning and work are important components of the undergraduate CSD education.

5. How can we improve the preparation of undergraduate students for other career paths (e.g., research assistants, careers in other fields)?

Undergraduate degrees in CSD should be broad enough to prepare students for futures in a range of other fields, including neuroscience (especially as related to language), medicine (especially as related to the structures and functions essential to communication), education, psychology, and engineering (as related to machine generation and recognition of human language). In keeping with the *ASHA's Envisioned*

Future: 2025 document (ASHA, 2015), CSD undergraduate education should provide students with a foundation for advancing, sustaining, and promoting the discipline and the development of a collaborative interprofessional attitude.

IV. Conclusions and Recommendations

The undergraduate degree in CSD involves the study of human communication and related disorders. In the past, programs have largely focused on preparing students for graduate clinical training in speech-language pathology or audiology. However, the potential of the undergraduate degree as envisioned by the AAB is much broader. Undergraduate preparation should provide students with greater depth and breadth in science and in the foundations of the discipline than have been provided in the past. We also recognize that this focus needs to be continually modified as science, technology, health care, and educational models evolve and that, through this process, the value of the CSD degree will be enhanced. The charge of the AAB was to review trends, discuss options, and make recommendations regarding modifications that undergraduate programs might make in order to meet the changing demands and trends. Four specific recommendations are:

- (1) Programs should be broadly focused on all aspects of human communication, with an emphasis on STEM and behavioral sciences learning.
- (2) The undergraduate degree should prepare students for a variety of career paths, including graduate work in speech-language pathology, audiology, or speech and hearing sciences. It also can be a foundation for other related disciplines and careers.
- (3) Undergraduate education should foster collaboration and interprofessional attitudes.
- (4) Resources should be prioritized for the preparation of graduate education in CSD (e.g., AuD, SLP, PhD) and reflect best practices in teaching and learning.

It is the conclusion of the AAB that these recommendations will move the field toward a broader and more relevant influence on society in the future. This report represents the most current and comprehensive statement on undergraduate education in CSD. It should be used as the reference document about undergraduate programs and have wide dissemination.

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Appendix

Undergraduate Prerequisites Table 1

MINIMUM UNDERGRADUATE COURSE REQUIREMENTS

Professional Degree	Anatomy & Physiology		Biology		Chemistry			Physics			Social & Behavioral Sciences		Additional Coursework														Entrance Exam	Source					
	Anatomy	Anatomy & Physiology I	Anatomy & Physiology II	Physiology	Biology/Biological Sciences	Bio I	Bio II	Chemistry	Chemistry I	Chemistry II	Physics	Physics I	Physics II	Psychology	Social/Behavioral Sciences	Statistics	Math	Human Development	Medical terminology	English Comp/Writing	Humanities	Ethics	Computer Science	First Aid/CPR	Nutrition	Physical Activity			Observation	Other			
Chiropractic	X	X					X	X	X	X	X	X	X	X	X																SR	Not Required	American Chiropractic Association
Dentistry (DDS)					X	X	X	X	X*	X*	X	X	X																		SR	Dental Admissions Test	American Dental Association
Education (MA)																															GRE (most)	UCLA, Harvard, Stanford	
Genetic Counseling (MS)					X		X	X					X		X															SR	X* GRE	Accreditation Council for Genetic Counseling	
Nursing	X		X	X											X	X								X						GRE	American Association of Colleges of Nursing		
Occupational Therapy (MA)	X			X									X		X	X														GRE	GMU Prehealth Advising		
Optometry (DO)	X	X	X	X#	X	X	X*			X			X	X	X	XXX			X											SR	XX Optometry Admissions Test	GMU Prehealth Advising	
Physical Therapy (DPT)	X		X	X			X	X			X	X	X																	SR	GRE	APTA Centralized Application Service	
Psychology (MA/PhD/PsyD)													X	X	X															GRE	American Psychological Association		
Public Health																														GRE	Harvard, UNC, Michigan, Hopkins, Arizona		
Rehabilitation Science																														GRE			
Social Work																														Not Required	USC, Penn, UW, Baylor		

Key

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