

UC DAVIS SCHOOL OF MEDICINE CURRICULUM REDESIGN PLANS

Integrated EXplorative Patient- and Learner-Oriented Education

(I-EXPLORE) Three-Phase Education (e³)

Version 01.08.2020

Kristin A. Olson, MD (Facilitator); Joanna Arnold, PhD; Paul Aronowitz, MD; Hillary Campbell, MD, MPH; Melody Y. Hou, MD, MPH; Russell Jones, MD; Joseph Kim, MD; Santiago Lombo Luque, BA; Theresa Murdock-Vlautin, MD; Amanda Phares, MD; Jennifer Plant, MD, MEd; Luis Fernando Santana, PhD; Andres Sciolla, MD; Barbara Shacklett, PhD; Lane Squires, MD; Sarah Westcott, BA; Marjorie Westervelt, MPH; Barton Wise, MD, MSc.

Acknowledgments

We are very grateful to Vice Chancellor Lubarsky, Interim Dean Berglund, and Dean Brashear for initiating and supporting this curriculum redesign effort. We are pleased with our work product and consider it a model for collaboration between the Office of Medical Education and faculty.

We also offer our deepest thanks to the leaders, faculty, resident physicians, medical students, and staff from the UCDSOM community and beyond who so generously took the time to offer recommendations and feedback as we sought to craft curriculum design plans that truly reflected our community's needs.

We could not have completed these plans without you.

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I. Abraham Flexner's Impact on Modern Medical Education

Throughout the 1800s, most American medical education was brief and dubious in quality, primarily relying on passive apprenticeship and a set of lectures twice delivered by doctors of limited knowledge themselves. But change was on the horizon. Experimental medicine was flourishing within German universities, and many American physician travelers returned home as champions of the empirical approach in our own medical schools and hospitals. It was against this backdrop that the most radical curricular renewal effort in the history of American medical education was mounted by the American Medical Association, when it invited the Carnegie Foundation for Advancement of Teaching to comprehensively review all American medical schools. Educator Abraham Flexner led the study for the Carnegie Foundation in 1910, drawing upon his visits to every American medical school to draft the sternly worded [Flexner Report](#). Key recommendations from Flexner's report include the following:

- All medical schools should be university-based.
- The first two years of medical school instruction should consist of biomedical (basic) science to foster a scientific mindset, and the latter two years of medical school instruction should consist of clinical experience in a teaching hospital supervised by university physician faculty. (This was later described as the "2+2" model.)
- Direct experience in scientific investigation should be acquired in the clinic or lab.
- Instruction should come from physician scientists comfortable with both the clinical and research realms.
- Admissions requirements should include a bachelor's degree with science emphasis rather than high school education alone.
- Fewer individuals should be accepted to medical school and fewer medical schools should exist.

The impact of the Flexner report on American medical schools was swift and dramatic. Within a decade of its publication, approximately one third of schools closed or merged (disproportionately affecting those for women and African Americans). Medical accreditation, board certification, and licensing procedures were strengthened to better monitor medical schools and physicians. State medical boards partnered to create the Federation of State Medical Boards in 1912, and the National Board of Medical Examiners (NBME) formed in 1915 to assist with state-recognized examinations of physicians in training. Applicants were newly required to have a bachelor's degree with prerequisite training in biology, inorganic chemistry, organic chemistry, and physics. And in response to the ensuing attrition rates that approached 50%, the Medical College Admissions Test (MCAT) was introduced to better confirm applicant readiness for medical school ([McGaghie, 2002](#)).

Flexner's "2 + 2" model was truly transformative and must be lauded for strengthening the academic rigor, scientific foundation, standardization, and experiential learning present today within medical schools. In recent decades, however, the traditional Flexnerian model has been

increasingly recognized as unable to fully meet the needs of modern physicians-in-training and health care systems—and, ultimately, our patients and communities. In 2010, one hundred years after its release of the Flexner report, the Carnegie Foundation for Advancement of Teaching released a follow up report titled [Educating Physicians: A Call for Reform of Medical School and Residency](#). This report strongly advocated for a remodeling of medical education curricula to standardize learner outcomes, individualize the learner process, employ more and better forms of integration, nurture habits of inquiry, and focus on professional identity formation.

The national response to the Carnegie Foundation’s second clarion call for major curricular reform has been robust. According to the [AAMC Curriculum Inventory site](#), 84.4% of American medical schools in 2017-2018 were planning, implementing, or recently implemented curriculum change within the past three years ([Appendix 1](#)). Of 147 respondent medical schools, 113 were modifying the pre-clerkship phase (historically the first and second year), 92 were modifying the clerkship phase (historically the third year), and 85 were modifying the post-clerkship phase (historically the fourth year) ([Appendix 2](#)). The most commonly enacted curricular changes emphasized the following themes, in descending order ([Appendix 3](#)):

- Biomedical science content integration (e.g., a “one pass” organ-based curriculum)
- Interprofessional education
- Self-directed learning
- Simulation experiences
- Competency-based education
- Shortening of pre-clinical (pre-clerkship) phase
- Online instruction
- Team-based learning

In looking back at the last one hundred years, we can see that as clinical medicine changes, so does medical education. Continuous quality improvement in clinical medicine and curriculum renewal in medical education are parallel healthy, introspective processes that foster mission alignment, preservation of important gains, and innovation for areas in need of improvement. The Liaison Committee on Medical Education (LCME) considers continuous quality improvement in education so fundamental that it has been included as an element of medical school accreditation ([LCME Functions and Structure of a Medical School, 2020-2021: Element 1.1](#)).

II. The UC Davis School of Medicine Curriculum

Given our greater than 50-year history as a medical school, the UC Davis School of Medicine has already undergone multiple rounds of curricular revision based on our evolving needs and the changing landscape of medical education. However, the curriculum has been relatively stagnant in recent history, with our last significant curricular changes occurring 15-20 years ago.

A general timeline for key events in our medical school’s history has been published online ([UCDSOM Historical Timeline](#)).

The current UCDSOM [curriculum](#) is essentially a Flexnerian “2 + 2” model, with students enrolled in more than 30 individual, mostly single-department owned courses organized within four loosely themed blocks in the first two years. A dedicated USMLE Step 1 study period rounds out the second year.

	July	August	September	October	November	December	January	February	March	April	May	June
	FOUNDATIONS BLOCK						MECHANISM & DISEASE BLOCK					
Year 1	Gross Anatomy						Endocrine / Nutrition / Reproduction / Genetics (E.N.R.G)					
	Human Physiology						General Pharmacology					
	Cell and Tissue Biology						Oncology	Microbiology				
	Molecular Medicine						General Pathology		Immunology			
	Population Health and Evidence-Based Medicine						Critical Appraisal of Topics in Population Health					
	Health and Humanity						Health and Humanity					
	Clinical Skills A						Clinical Skills A					
	Clinical Experiences A						Clinical Experiences A					

	BRAIN & BEHAVIOR BLOCK				PATHOPHYSIOLOGY BLOCK					
Year 2	Clinical Neurosciences	Musculoskeletal	Dermatology	Hematology	Pulmonary & Cardiovascular System	Nephrology	Gastroenterology	USMLE Prep Period		
	Neuroanatomy									
	Psychiatry									
	Foundations of Bioethics									
	Systemic Pathology	Systemic Pathology		Systemic Pathology						
	Pharmacology B	Pharmacology C		Pharmacology C						
	Population Health & System Science	Population Health & System Science		Population Health & System Science						
	Clinical Skills B	Clinical Skills B		Clinical Skills B						
Clinical Experiences B	Clinical Experiences B		Clinical Experiences B							

The clerkship-based third year is prefaced by a “Transition to Clerkships” course, followed by eight-week clerkships in Surgery, Internal Medicine, Obstetrics/Gynecology, Pediatrics, Psychiatry, and Family Medicine/Selective (differently ordered for each student). Longitudinal experiences in Primary Care and Doctoring are also included.

							Transition to Clerkships	
Year 3	Internal Medicine	OB/GYN	Pediatrics	Family Medicine	Enrichment Block	Psychiatry	Surgery	
	Doctoring 3							
	Primary Care Continuity Clinic							

The fourth-year supplies breadth and depth through multiple 4-week courses with the intent of helping students to prepare for residency, ending with a two-week “Transition to Residency” course immediately before graduation.

Year 4	38 weeks of Required Coursework					
	4 weeks of Acting Internship Emergency Medicine	4 weeks of Acting Internship Inpatient Core Specialty	4 weeks of Acting Inpatient Any Specialty	4 weeks of Scholarly Project or Special Study Module	20 Weeks of Additional Electives	Transition to Residency

The PRIME/ACE-PC tracks overlap with the traditional curriculum in terms of the pre-clerkship experience, but differ in terms of program-specific orientation, summer break, mentorship, and clinical training opportunities as described [here](#).

III. Our Curriculum Redesign Process

In December 2018, UC Davis Vice Chancellor of Human Health Sciences David Lubarsky and Interim Dean of the School of Medicine Lars Berglund asked Associate Dean for Curriculum and Medical Education Kristin Olson to assemble a curriculum design team (CDT). The CDT was to draft 2-3 curriculum redesign plans by December 2019 for consideration by our faculty committees. Design team members were selected by Associate Dean Olson to allow for team diversity in terms of degrees earned, disciplinary expertise, experience in teaching different curricular phases or content, understanding of best practices and theory in education and assessment, current and previous employer affiliation (including non-UC Davis employers), firsthand experience as a learner within our UME and GME programs, membership in groups underrepresented in medicine, and membership in departments underrepresented in our curriculum. Other than Associate Dean Olson, the final CDT included 11 faculty, 2 residents, 2 medical students, and 2 Office of Medical Education staff ([Appendix 4](#)).

From the outset, CDT members agreed that it was important to not bring a predetermined “agenda” to the curriculum redesign process, as we needed open-minded, reflective individuals who would weigh the evidence and engage in deep discussion before reaching a conclusion. The twice monthly team meetings began in March 2019 and were led by rotating team members who shared evidence germane to the monthly topic (e.g., journal articles and editorials, surveys, external and internal reports), prepared presentations, and drafted voting ballots, with Associate Dean Olson assuming a facilitator/assistant role. Topical materials and information were shared in advance through an online platform, and CDT members were asked to solicit feedback from colleagues to bring to the CDT discussion table. Because the discussion was considered an essential component of the design process, CDT members only cast votes if they were present for the discussion. Some proposals prompted significant variation in opinion, while others engendered complete or near complete consensus. Proposals required endorsement by 2/3 or more of the voting members to advance, and occasionally were subject to later revision by the CDT as the plans evolved. Associate Dean Olson voted only to break a tie, which occurred with <5% of proposals.

Our timeline was ambitious, but unavoidably so given the seriousness and extent of the community concerns regarding the curriculum and the upcoming LCME visit in January 2022. Because we had not undertaken significant curriculum redesign in some time, there were many issues to consider. We needed to proceed quickly and efficiently, while making every effort to be inclusive, open-minded, and transparent about our process.

We sought input from myriad external and internal sources. External sources included medical students, resident physicians, faculty, and vice and curricular deans from several different medical schools, including but not limited to those within the University of California system. External LCME consultants LuAnn Wilkerson, PhD and Lynn Crespo, PhD, provided us with several recommendations, including that we implement a “new integrated curriculum.” Several CDT members visited the [University of Texas at Austin Dell Medical School](#), a school well-regarded for its peer- and self-directed learning, curricular integration, and emphasis on leadership and dual-degree offerings. We returned home inspired by the Austin experience.

Perhaps most importantly, we engaged frequently with our own UC Davis health sciences community around the topic of curriculum redesign. Internal survey results on important topics were analyzed and incorporated into our discussions. Four broad community forums generated numerous excellent recommendations from participating deans, department chairs, faculty, residents, students, and staff. Additional forums were held with more stakeholders from specific curricular phases (e.g., fourth year Instructors of Record). CDT updates were frequently provided by Associate Dean Olson and other CDT members to the Faculty Executive Committee, the Committee on Educational Policy, the Block Council, the Third Year IOR committee, and the Fourth Year Oversight Committee. Associate Dean Olson extended invitations to individually meet every department chair and his or her key educators to discuss the proposed plans and how they would involve each department, resulting in many productive dialogues. Health sciences campus community members submitted individual curricular recommendations via email and through a publicized website link. Finally, numerous faculty and students were invited “special guests” of the CDT who either communicated with Associate Dean Olson or attended design team meetings. The input provided by these individuals was invaluable in allowing the CDT to cast a wider net while remaining relatively small and nimble.

IV. Why Does Our Curriculum Need to Change? Guiding Principles in Redesign

We have evidence that our current curriculum is not fully achieving its intended purpose. Students have increasingly expressed their frustration with the structure, sequence, distribution, and content of the curriculum through many avenues, including but not limited to block, course, and faculty evaluations, focus groups, graduation questionnaires, surveys, public forums, faculty committee meetings, and this and previous redesign efforts. Faculty have described the current content sequence as illogical from a knowledge scaffolding standpoint, and have observed the process of introducing and integrating content is often difficult and

frustrating. Surprise is expressed by faculty and students alike at discovering various curricular gaps and redundancies, which are rarely intentional. Clinical faculty have observed that students could be better prepared for the demands of the core clerkships. Our average student USMLE Step 1 score began declining several years ago, and remains several points below the national average. The siloed nature of our curriculum hinders creation of multidisciplinary exam questions more akin to those on USMLE Step 1. Staff have commented that the lack of standardization of the weekly schedule makes their work challenging, and students have indicated this lack of standardization impacts their wellbeing by making studying and planning more difficult. Leadership, faculty, and staff have expressed concern that our aged curriculum discourages applicants who seek the advantages of a more modern curriculum. And, external LCME consultants Drs. Wilkerson and Crespo have recommended curricular and structural modifications before our upcoming site visit in January 2022 to ensure full compliance with Liaison Committee on Medical Education (LCME) accreditation standards.

A new curriculum could remedy these concerns. But beyond that, what should be the framework for this new curriculum? What are our guiding principles in curriculum design?

Guiding Principles of the New Curriculum

In identifying our guiding principles, we focused on our school mission, health sciences campus community (including faculty, resident physicians, staff, and students) input, and the evolving national expectations in medical education, including those advanced by the Carnegie Foundation. Our UCDSOM missions prioritize collaboration, diversity, regional community needs, and learner-centered education resulting in patient-centered care. We used the lattermost priority to design four UCDSOM community forums framed around the principles of a learner- and patient-centered curriculum. These forums generated dozens of creative and thoughtful suggestions from participants ([Appendix 5](#)). The CDT's own internal discussions were then instrumental in bringing together these varied sources of input to craft our guiding principles and the resulting curricular plans.

Our guiding principles can be categorized as learner-centered, patient-centered, and both learner- and patient-centered. The principles detailed in each category are annotated with 1, 2, or 3 to indicate their anticipated representation in the pre-clerkship phase (e¹), clerkship phase (e²), or post-clerkship phase (e³) of the new curriculum.

Learner-Centeredness

- Well-designed, horizontally and vertically [integrated content](#) creates scaffolding for progressive understanding and minimizes extraneous [cognitive load](#). (1, 2, 3)
- Greater breadth in medical knowledge (e.g., head and neck pathology, more selectives, neurology as required rotation [[Appendix 6](#)]) expands learner understanding of important concepts in clinical medicine. (1, 2, 3)

- [Clinical reasoning](#) and evidence-based medicine are fundamental to the work of the physician providing high-value care, and align with the Institute of Medicine [proposal](#) that our health care system “place more stress on teaching evidence-based practice.” (1, 2, 3)
- [Step 1-relevant](#) content and assessment methods (e.g., [peer instruction](#), [weekly formative quizzes](#), and integrated [NBME custom exams](#)) better support learners in preparing for this high-stakes exam. (1, 2 in Gold plan)
- [Self-directed learning](#), schedule standardization, and [e-Learning](#) (e.g., more online lectures in pre-clerkship curriculum and online coursework for the post-clerkship period) enables students to take control of their own learning and use study methods that suit them best. (1, 3)
- Customization of student learning experience and promoting habits of inquiry occurs with [intersessions](#) (which include exposure to multiple disciplines, optional [areas of scholarly concentration](#), elective offerings, and opportunities for remediation and study skill strengthening). (1, 2, 3)
- [Workplace-based assessment \(such as entrustable professional activities\)](#) allows for better standardization of outcomes, more frequent learner feedback, and greater clarity surrounding learner progression toward residency and eventually unsupervised practice. (1, 2, 3)
- [Career advising](#) and [mentorship](#) foster professional identity formation and contribute to wellness. (1, 2, 3)

Patient-Centeredness

- [Meeting the physician workforce needs of our communities](#) occurs through training a diverse group of primary care physicians, specialists, and researchers who directly contribute to serving these communities. (1, 2, 3)
- Learning about [diseases and health care issues of greatest concern for our local communities](#) such as [diabetes mellitus, asthma, cancer, and mental health, and the need for more active living and healthy eating](#) prepares our physicians to be community advocates and leaders. (1, 2, 3)
- Understanding the “whole patient” – patient signs, symptoms, goals, values, and need for functionality, as well as the [family caregiver perspective](#), equips physicians to provide more effective care. (1, 2, 3)
- Simulation and standardized patient experiences allow learners to practice in a low-stakes setting, [reducing risk to actual patients](#). (1, 2, 3)
- Integration is promoted through patient-centered [threads](#) including **diagnostic medicine, stages of life** (including content relating to pediatrics, geriatrics, sex/gender differences, chronic illness and disability, death and dying, often through use of [fictional families](#) whose needs evolve over time), **care for vulnerable populations** (including social determinants of health), and **preventive medicine** (including nutrition, obesity,

exercise, sleep, wellness, alcohol, tobacco, and cancer prevention), joining the already established **pain medicine** thread as topics of emphasis. (1, 2, 3)

Combined Learner- and Patient Centeredness

- [Earlier clinical experience](#) beginning in the first year provides [contextualization](#) for biomedical and health systems science, benefiting learners and their future patients. (1)
- Content from the third pillar of health systems science, as described later in the [section](#) on the new curricular framework, encompasses much of the complexity of health care delivery for the learner and their patients. (1, 2, 3)
- Inclusiveness of all SOM departments and faculty in undergraduate medical education across all four years allows for expanded collaboration and greater learner understanding in biomedical science, clinical science, and health systems science. (1, 2, 3)
- Greater emphasis on team-based care and [interprofessional education](#) prepares learners to navigate and lead within our nuanced health care system, benefiting learners, their colleagues, and their patients. According to representatives from the UC Davis Health patient advocate office, more training in team management, leadership, and communication would be useful. Similarly, the Institute of Medicine [proposed](#) that our health care system should “provide more opportunities for interdisciplinary training.” (1, 2, 3)
- Addressing learner [wellness](#) and [burnout](#) issues helps preserve [compassion and empathy for patients](#). (1, 2, 3)
- Supporting our diverse learners through increased [active learning](#) and [mentorship](#) increases the number of underrepresented in medicine physicians to better [meet the needs](#) of our diverse regional communities (1, 2, 3)

UC Davis Strengths to Expand Upon

In addition to increased learner- and patient-centeredness, another guiding principle for the CDT was building upon our natural strengths as a medical school. In recent years, our geographical separation has attenuated our connection with the UC Davis main campus departments and schools. We are interested in remedying this, in part by incorporating main campus expertise in topics such as veterinary medicine, agricultural science, global health, public health, social science, and informatics into the new curriculum. In addition, our location in Sacramento positions us well to offer firsthand experience in health care advocacy and policy, with the state capitol building only a few miles away. Finally, we want our students to fully benefit from our expertise and leadership in both primary care and clinical/translational research by reinforcing and adding to this content in the new curriculum.

Fundamental Framework for the Blue and Gold Plans

Using our guiding principles, we developed the following curricular framework for both the “Blue” and “Gold” plans.

- **Graduation competencies.** Our present curriculum is framed around our [graduation competencies](#), which is an approach that would continue in the new curriculum. Revision of these competencies is in process by the Committee on Educational Policy Curriculum Review Subcommittee to ensure that they reflect modern expectations. The revised graduation competencies will serve as the primary scaffold for the new curriculum, allowing for mapping of all courses and sessions. Emphasis will be on competency-based progression through the curriculum, with regular opportunities for expanded learning or remediation as appropriate.
- **Three pillars of biomedical science, clinical science, and health systems science.** Biomedical science and clinical science have been rightfully valued in medical education since the Flexnerian reforms, but health systems science—incorporating concepts ranging from health care systems and delivery to quality improvement and patient safety to population health and social determinants of health—is increasingly recognized as similarly [essential knowledge](#) for the modern physician. The AMA proposal that health systems science be recognized as the “[third pillar](#)” has been reinforced by multiple organizations, such as the Institute for Healthcare Improvement (which describes a [triple aim](#) of improving patient experience, improving population health, and reducing health care costs), the Institute of Medicine (which describes how physicians must provide care that is “safe, effective, patient-centered, timely, efficient, and equitable” with modification of our health care systems to limit [medical errors](#)), and the Agency for Healthcare Quality Research (which promotes [six priorities](#) in improving health and health care quality). Additionally, the National Board of Medical Examiners (NBME) has been making concerted efforts to increase representation of health systems science in the USMLE Step 1, and our UCDSOM stakeholders rated numerous health systems science topics as high priority “threads” in the new curriculum ([Appendix 7](#)). Although biomedical science, clinical science, and health systems science are described as three separate pillars, we envision them as fully integrated throughout the entire curriculum.

Lastly, it is important to note that the “Blue” and “Gold” plans each provide an outline for the primary medical school curriculum. Detailed, week-by-week content will be planned and created by the participating faculty and staff after a plan is selected, as described in “[Next Steps in Implementation](#).” Furthermore, we acknowledge that our tracks, including Rural PRIME, REACH PRIME, TEACH-MS and ACE-PC may need “modifications to promote continued success for the PRIME, TEACH-MS and ACE-PC students and the communities for which they are working hard to serve,” as described in a letter from Drs. Fancher, Gonzalez-Flores, and Tran-Reina ([Appendix 8](#)).

V. The Blue Plan – “Step 1 Stays in Place”

Blue e¹ Pre-Clerkship/Pre-Clinical Curriculum (91 weeks, starting August 2021 and finishing April 2023)

Particularly important guiding principles for this curricular phase include content integration, inclusivity of all SOM departments, earlier clinical experience, schedule standardization with incorporated self-directed learning time, customization of experience through intersessions, strengthened Step 1 preparation, and promotion of student wellbeing.

The total footprint of this curricular phase does not change from that of the present curriculum (91 total weeks, including Step 1 study time and the Transition to Clerkship course), with students entering clerkships in early May of their second year.

Several important elements are added to this curricular phase. Strengthening the health systems science pillar (30 hours), expanding biomedical and clinical science to include currently underrepresented disciplines (anesthesiology, otolaryngology, ophthalmology, pediatrics, physical medicine and rehabilitation, radiation oncology, radiology, toxicology, and urology) (60 hours), and incorporating new threads (30 hours) requires approximately 120 hours (5 weeks at 24 hours/week) of new content. This new content is augmented by refinement of pre-existing content. To better allow our students to participate in national experiences (e.g., research, military obligations), three weeks are added to a later summer break with one week subtracted from one winter break and one week subtracted from a fall break, for a net addition of one week of break. Four more weeks are needed for the intersessions, and the equivalent of 4 weeks (96 hours) is needed for clinical preceptor time for a new longitudinal clinical experience approximately one afternoon every other week across this curricular phase. In total, this amounts to approximately 14 weeks of new content.

This 14 weeks of new content will be absorbed through a combination of increased and improved content integration, shifting of advanced biomedical science content to the post-clerkship period for specialty-specific biomedical science study, and content compression/reduction. Once a curriculum plan is approved, specific decisions on creating, integrating, revising, compressing, shifting, or reducing content will occur in workgroups that plan the curriculum week by week for the subsequent year. It is important to note that the 14 weeks of new content represent approximately 20% of the entire pre-clerkship curriculum, and that our proposal continues to strongly emphasize both biomedical and clinical science – thereby preserving and reinforcing the best elements of the Flexnerian model.

One potential means of shifting research-focused content out of the formal curriculum is our proposed “Frontiers in Medical Research” series. This is a new, optional noontime seminar series for medical students. Faculty who would like to share research advances or significant anticipated changes in medicine with medical students are encouraged to participate, reserving required class time for content that relates to current standard of clinical practice. Additional optional noontime seminar series may be similarly introduced as a means of expanding our educational and advisory offerings to interested students.

The week-long intersessions are opportunities for decompression and individualization within the otherwise highly integrated curriculum. In general, the intersessions are considered opportunities for exploration and inquiry and will be organized as follows:

- *Monday/Tuesday*: Electives and/or interprofessional experiences.
- *Wednesday*: Exposure to different disciplines (through “career days” or mentorship opportunities).
- *Thursday/Friday*: Areas of scholarly concentration (optional).

Remediation, study skill development, or vacation are also potential uses of intersession time. Specific calendar weeks are proposed for the intersessions in the illustrations provided below for the Blue and Gold plans, but may need to shift earlier or later based on logistical issues as the surrounding coursework is further developed.

The optional “areas of scholarly concentration” (ASCs) are a flexible means by which students can further customize their education and differentiate themselves. Anticipated ASC topics include care for underserved populations (PRIME track students), clinical or translational research, medical education, health care policy/advocacy, patient safety/quality improvement, and global health; additional topics (such as medical informatics, medical humanities, and health care finance) may be added in the future. Basic content in most of these areas will be present in the standard curriculum for all students, with the ASC understood to offer more advanced or complex modular content that is largely online with potential additional group or experiential learning. Protected time for this work is included in the intersessions, but students will have the flexibility to complete the content up until the end of the clerkship year. In addition, students may choose to use a two-week clerkship selective to work on their ASC. Should students complete an ASC project of sufficient merit, they will receive 4 weeks of clinical didactic credit in the post-clerkship period. Distinction for having completed the ASC requirements will be included in the student Dean’s letter. The ASC also provides an opportunity for interprofessional intersection in education with the UCD School of Nursing. In keeping with our more inclusive educational model, we anticipate that the online ASC modules will be accessible to UCD resident physicians and community physicians as a means of offering individualized progression in the UME-GME-CME continuum with the potential for application in the clinical or community settings.

The following merged courses are proposed below. These are developed based on input from numerous external and internal sources with recommended time allotments based on the anticipated content within each course. For ease of reading, time lengths are specified in **purple font**.

Human Architecture and Function: Gross anatomy, microscopic anatomy (normal histology), clinical history and physical examination skills, and health systems science are merged into one integrated experience. The class may be divided periodically into groups that rotate through different elements of the course, including lecture, cadaveric dissection, and clinical skills

training for the corresponding regions of the human body. This approach has the benefit of easing the burden on the current anatomy lab, which is currently at capacity for space.

Anatomic prosections may be used in lieu of some dissection experiences, with the potential for assistance in preparing prosections from some surgical specialty departments (e.g., orthopaedic surgery). Embryology and/or radiology content could be shifted out into the organ systems to allow for more longitudinal reinforcement of anatomic concepts and to decompress this course. Advanced concepts in anatomy and microscopic anatomy can be shifted to the post-clerkship period as specialty-specific biomedical science instruction for smaller groups of students. For example, a more detailed understanding of head and neck gross and microscopic anatomy and neuroanatomy could be provided over a week-long period in the post-clerkship phase for students entering otolaryngology, ophthalmology, neurology, or neurosurgery, building upon the more basic anatomy instruction that all students received in the pre-clerkship phase. Recommendations for the anatomy course have been made by CDT member Amanda Phares, a surgery resident here with personal experience in the UCD SOM and undergraduate anatomy courses ([Appendix 9](#)).

Weekly schedule standardization does not yet take effect for this segment given the logistical complexity, though recorded lectures, active learning, and half days of free study time are encouraged where feasible. **Total time = 8 weeks, 24 contact hours per week.**

Molecular and Cellular Medicine: Genetics, biochemistry, physiology, pharmacology, general pathology, clinical skills and experiences, and health systems science (including health and humanity) are merged into one integrated course. Basic, foundational principles are taught here in preparation for the longitudinal exploration of organ-specific molecular and cellular medicine in the organ systems. The afternoon longitudinal clinical preceptor experience begins during this course, alternating with clinical skills content one half-day every other week. Weekly schedule standardization of active learning on MWF mornings. The first week-long intersession occurs immediately after this course. **Total time = 6 weeks, 24 contact hours per week.**

Pathogens and Host Defense. Basic, foundational principles are taught here in preparation for the longitudinal exploration of organ-specific medical microbiology, immunology, and pharmacology. Health systems science content (including health and humanity) is included as well. Afternoon clinical preceptor experiences alternate with clinical skills content one half-day every other week. Weekly schedule standardization occurs with active learning on MWF mornings. **Total time = 5 weeks, 24 contact hours per week.**

Winter break lasts two weeks, followed by the second week-long intersession at the start of January.

Hematology, Cardiology, Pulmonology, and Nephrology. Full integration of biomedical science (“normal”), clinical science (“abnormal”), and health systems science (including health

and humanity) occurs in this course for hematology, cardiology, respiratory, and renal topics. Relevant genetics, biochemistry, physiology, pathology, pathophysiology, pharmacology, immunology, microbiology, and threads are included. Afternoon clinical preceptor experiences alternate with clinical skills content one half-day every other week. Weekly schedule standardization occurs with active learning on MWF mornings. The third week-long intersession occurs midway through this course, immediately before **spring break**. **Total time = 19 weeks, 24 contact hours per week.**

Summer break – 8 weeks long (an increase of 3 weeks) with a timing shift to June and July. This is to align better with the traditional summer break and allow for more national, regional, and local summer extracurricular opportunities for our students, including in research.

Endocrinology, Gastroenterology, and Reproduction. Full integration of biomedical science (“normal”), clinical science (“abnormal”), and health systems science (including health and humanity) occurs in this course for endocrinology, gastroenterology, and reproduction. The male GU system is incorporated into reproduction. Relevant genetics, biochemistry, physiology, pathology, pathophysiology, pharmacology, immunology, microbiology, and threads are included. Afternoon clinical preceptor experiences alternate with clinical skills content one half-day every other week. Weekly schedule standardization occurs with active learning on MWF mornings. The fourth week-long intersession occurs midway through this course. **Total time = 16 weeks, 24 contact hours per week.**

Skin, Bones, and Capstones. Full integration of biomedical science (“normal”), clinical science (“abnormal”), and health systems science (including health and humanity) occurs in this course for musculoskeletal and dermatologic medicine. Relevant genetics, biochemistry, physiology, pathology, pathophysiology, pharmacology, immunology, microbiology, and threads are included. Embedded throughout this course are occasional capstone cases that bring together multiple systems, particularly with musculoskeletal or dermatologic manifestations. Afternoon clinical preceptor experiences alternate with clinical skills content one half-day every other week. Weekly schedule standardization occurs with active learning on MWF mornings. **Total time = 3 weeks, 24 contact hours per week.**

Winter break lasts two weeks.

Brain and Behavior. Full integration of biomedical science (“normal”), clinical science (“abnormal”), and health systems science (including health and humanity) occurs in this course for neuroanatomy, neuroscience, psychiatry, and bioethics. Head, neck and eye disease is incorporated. Relevant genetics, biochemistry, physiology, pathology, pathophysiology, pharmacology, immunology, microbiology, and threads are included. Embedded throughout this course are occasional capstone cases that bring together multiple systems, particularly with neurologic, otolaryngologic, or ophthalmologic manifestations. Afternoon clinical preceptor experiences alternate with clinical skills content one half-day every other week. Weekly

schedule standardization occurs with active learning on MWF mornings. **Total time = 8 weeks, 24 contact hours per week.**

Although we preferred having Skin, Bones, and Capstones be the last course in the Blue Plan, doing so would require that Brain and Behavior be interrupted by winter break three weeks into the eight-week course. We thought that undesirable. However, this option could still be considered if a natural break in content could be created at that point, allowing students to be tested before winter break on that content in a manner that allowed for a true vacation during the winter break.

Step 1 Study Period. Eight weeks to review material in preparation for USMLE Step 1 examination.

Transition to Clerkship. Emphasis on skills for success in clerkship period. Inclusion of some health systems science content. No weekly standardization. **Total time = 1 week, 40 hours includes preparation for active learning.**

TIMELINE

Blue Plan	August				September				October				November				December				January				February				March				April				May				June				July							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
Year 1	Pre-Clerkship Phase																																																			
	Human Architecture (8 wks)								Molecular and Cellular Medicine (6 wks)				Intersession	Pathogens and Host Defense (5wks)				Winter Break	Intersession	Hematology, Cardiology, Pulmonology, and Nephrology (19weeks)								Intersession		Spring Break		Hematology, Cardiology, Pulmonology, and Nephrology (19 weeks)								Summer Break (8 wks)												
Year 2	Pre-Clerkship Phase																																																			
	Endocrinology, Gastroenterology, and Reproduction (16 wks)					Intersession	Endocrinology, Gastroenterology, and Reproduction (16 wks)								Skin, Bones, and Capstones (3 wks)			Winter Break	Brain and Behavior (8 wks)				Step 1 Study Period (8 wks)				Transition to Clerkship (1 wk)	91 weeks total: - 65 weeks core content - 13 weeks vacation - 4 weeks intersession - 8 weeks Step 1 Study - 1 week TZC																								

SAMPLE WEEKLY SCHEDULE

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
8:00 AM	Problem-Based Learning (PBL) Prep Case 1	SDL	PBL Case 1	SDL	PBL Case 2
9:00 AM	PBL Prep Case 2	SDL	Peer Instruction	SDL	Peer Instruction

10:00 AM	Team-Based Learning (TBL)	ARS Lecture (or SDL)	TBL	SDL	Peer Instruction
11:00 AM	TBL	ARS Lecture (or SDL)	TBL	SDL	Peer Instruction
12:00 PM	Lunch	Lunch	Lunch	Lunch	Lunch
1:00-5:00 PM	Self-directed learning (SDL) time (view online lectures, self-directed learning)	Preceptor or Clinical Skills (Tues is one example – could be any M-Th weekday)	SDL	SDL	SDL

SCHEDULE DESCRIPTION: The sample weekly schedule shown above distributes the weekly allotment of 24 contact hours as follows. 12 weekday morning hours are reserved on MWF for active learning sessions in the classroom. 4 weekday afternoon hours once a week are reserved for clinical experiences or clinical skill-building (with the assigned afternoon varying depending on the student). 8 hours per week are used for (primarily recorded) lecture viewing in preparation for active learning sessions. The remainder of the time is for students to use to study or review materials using their preferred locations and methods.

The active learning sessions bring together multiple disciplines and content areas for increased efficiency. Primary teaching methodologies include [problem-based learning \(PBL\)](#), [team-based learning \(TBL\)](#), and [peer instruction \(PI\)](#). Live patient experiences are encouraged as well.

- In [problem-based learning](#), students assume responsibility for their own learning and work through cases both independently and in teams. On Mondays, students read through the case and jointly identify biomedical, clinical, and health systems science learning objectives. They individually prepare responses to the learning objectives using external sources of their own selection and bring their responses to the follow-up sessions on Wednesday and Friday, where they then teach one another. At the completion of each case, they are provided a “master list” of expected learning objectives for each case to use for exam preparation. Session facilitators are PBL process experts rather than content experts, and give students feedback about their teamwork efforts, including leadership skills, communication, and professionalism. Small classrooms are used.
- In [team-based learning](#), the entire class is present in a large room filled with tables designed to seat several students (e.g., BIMH 1000 or ASB 2310). With the assistance of content expert facilitators, the student teams work through several open-ended questions for complex, integrated cases. Teams are periodically called upon to share their answers with the entire class. Faculty then correct any misconceptions to ensure the entire class has the same understanding. This allows for conservation of faculty time because fewer faculty are needed for one session. Integration of biomedical science,

clinical science, and health systems science can readily be accomplished. Residents, fellows, and faculty can also assist as facilitators.

- In **peer instruction**, students answer faculty crafted and peer reviewed NBME-style questions using audience response clickers without use of study resources (e.g., notes, textbooks, smart phones, etc.) during the session. If a high percentage of students select the wrong answer, the class enters a brief round of peer instruction, in which they discuss the question and answer choices with adjacent peers. They then select an answer again, which becomes a (very small) part of their course grade. The correct answer and voting distribution for the class is then revealed, and the question and all answers are individually reviewed by content experts using 1-2 PowerPoint slides (a “mini explanation”). Eight to ten questions can typically be covered in an hour with this method, which is particularly useful for Step 1 review and coverage of many simple or straightforward diseases in a relatively short time period. One content expert faculty member and one process expert faculty member are typically needed per session. This is another method that conserves faculty time, though a staff member is also needed during the session to help manage the software and track collective student answers.
- PBL, TBL, and PI are preferred to “small group learning,” which divides the class into many groups in separate small classrooms. Drawbacks to small group learning include its need for simultaneous participation from many faculty with content expertise, thereby making disciplinary integration more difficult, and the inconsistency of learning experiences for students.

Lectures are primarily recorded in advance using a professional audio booth, allowing students to then review the lecture content during their self-directed learning time—typically in preparation for an active learning session. This approach is preferred because it decouples lectures from the artificial 50 minute length, asks less of faculty (because lectures will typically not need updating every year), provides students flexibility in timing and location of lecture viewing, minimizes unexpected disruptions from the various audiovisual recording difficulties we frequently encounter, and allows us to be more adaptive in times of crisis (e.g., the campus closure that occurred due to the poor air quality from the 2018 Camp Fire). Designated time will be available on Tuesday mornings for faculty who still strongly prefer to deliver content in person using the Audience Response System. For those sessions, student attendance remains optional and the session is recorded.

The longitudinal preceptor clinical experience begins after completion of the Human Architecture course and may occur on Monday, Tuesday, Wednesday, or Thursday afternoons, depending on the student and preceptor. Clinical skills content occurs in the afternoon on those weeks when the clinical experience does not occur. Therefore, students will consistently have one afternoon per week occupied, with the other four afternoons and Thursday morning free to allow for self-directed learning, including active learning preparation and lecture viewing.

Exams will be held on Fridays whenever possible to allow for a subsequent “golden weekend” in which students are not responsible for new content. Deadlines for quizzes and other assignments will be standardized across the curriculum, again to provide greater consistency and decrease extraneous cognitive load.

Blue e² Clerkship Curriculum (52 weeks, starting May 2023 and finishing April 2024)

Primary guiding principles for this curricular phase included an interest in promoting cohesive clinical team dynamics (through limited clerkship interruptions), integration of the biomedical, clinical, and health systems science (through intersession content), individualization/customization and flexibility (through the adaptive selective block and areas of scholarly concentration), and equitable treatment of all core clerkship disciplines (through similar lengths for each clerkship, as is the current practice).

Given our clinical site capacity, it was determined that the clerkship phase should remain at 52 weeks so that no two student classes overlap year after year. 4 weeks continue to be reserved for vacation, leaving 48 weeks for curricular content.

The 48 weeks incorporate 42 weeks of clerkships (7 clerkships, each lasting 6 weeks) and 6 weeks of intersessions.

- Internal medicine – 6 weeks
- Surgery – 6 weeks
- Pediatrics – 6 weeks
- OB/GYN – 6 weeks
- Psychiatry – 6 weeks
- Family medicine – 6 weeks
- Selectives – 6 weeks (3 x 2 weeks each)

Clerkship	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
	Internal Medicine						Intersession	Surgery						Summer Break	Intersession	Pediatrics						Intersession	Ob/Gyn						Intersession	Psychiatry						Winter Break	Intersession	Family Medicine						Intersession	Selectives							

For all core clerkships, students have at least the last two days of the clerkship protected for exam purposes. Typically, Thursday is the study day for all students, and Friday is the day of the shelf exam.

The selectives offer significant flexibility in the clerkship period. A wide variety of two- and four-week selectives will be offered, allowing students to potentially experience up to 3 different disciplines before beginning the post-clerkship period. Alternatively, selective time can be used for areas of scholarly concentration (ASC), preparation for deferred Step 1, remediation, medical leave, or vacation, with the recognition that selective time not used for a

patient care experience or ASC will need to be completed in the post-clerkship period as an advanced clinical clerkship instead.

Neurology becomes a new required 4-week long advanced clinical clerkship in the post-clerkship phase. However, students interested in neurology can petition to take it during their selective block in the clerkship period, potentially accompanied by a 2-week selective. Should this petition be approved, students will need to complete an additional 4 weeks of advanced clinical clerkships in the post-clerkship period in lieu of the neurology requirement there. (Of note, the neurology department faculty [preferred](#) that the required neurology experience be placed in the core clerkship year, which the CDT discussed at length and attempted to accommodate. Ultimately, however, it was decided that incorporating six weeks of intersessions and six weeks of selectives in the clerkship year was essential in preserving the guiding principles of integration, individualization, flexibility, and equitable treatment of existing clerkships, and the neurology requirement was shifted to the post-clerkship phase instead.)

Emergency medicine remains a required 4-week long acting internship in the post-clerkship phase. Students not interested in entering EM can petition to take EM during their selective block in the clerkship period. Should this petition be approved, students will need to complete an additional 4 weeks of advanced clinical clerkships in the post-clerkship period in lieu of the emergency medicine requirement there.

The continuity clinic is dissolved in lieu of the longitudinal clinical experience in the pre-clerkship period. It is recommended that Doctoring 3 be thoughtfully re-evaluated as described in [“Next Steps in Implementation.”](#)

Six separate week-long intersessions occur between clerkships. They protect the clerkship clinical teams from disruption, which was a common concern amongst both faculty and students. In addition, the intersessions allow for decompression, individualization, and integration of content between the three pillars. To ensure student engagement and appropriate progression, we recommend the intersessions be a separate longitudinal pass/fail course with course directors from biomedical science, clinical science, and health systems science. The intersession schedule is as follows:

- *Monday/Tuesday/Wednesday*: Doctoring 3, interprofessional education, thread content, and integrated biomedical, clinical, and health systems science content (e.g., [using Case Western approach to mapping integrated illness scripts](#))
- *Thursday*: area of scholarly concentration (or study skills/remediation if needed)
- *Friday*: Orientation for the next clerkship (potential to include simulation experiences)

Blue e³ Post-Clerkship Curriculum (36 required weeks within 52 calendar weeks, starting May 2024 and finishing April 2025)

In this curricular phase, selection of and preparation for residency are of paramount importance. Strong specialty advisory support is provided to ensure students have an appropriate breadth and depth of experience to position them well for the Match. Additional guiding principles included an interest in expanding required content in neurology and the intensive care unit setting, customization and flexibility (through the ratio of required weeks to calendar weeks, elective and vacation time, and areas of scholarly concentration), and specialty-specific integration of biomedical science, clinical science, and health systems science in the Transition to Residency course.

During this phase, students will need to take Step 2 CK and Step 2 CS, as well as the following requirements to fill the required **36 weeks** of content. Up to 8 weeks can be clinical didactics, and the remaining 28 weeks must include provision of direct patient care. Required content for this phase is described below, with new additions highlighted in green.

- 4 wks Emergency Medicine Acting Internship
- 4 wks Inpatient Acting Internship at UCDMC in core clerkship department
- 4 wks Inpatient or Ambulatory Acting Internship at UCDMC or away
- 4 wks ICU Acting Internship (also counts for an AI requirement)
- 4 wks Neurology Advanced Clinical Clerkship
- 4 wks Area Scholarly Concentration Clinical Didactic for students who complete a project (Doctoring 4 would become a “medical education” experience in this category)
- 12 wks advanced clinical clerkships/clinical didactics if also completing area of scholarly concentration; 16 wks if no area of scholarly concentration chosen
- 4 wks Transition to Residency, which includes specialty-specific biomedical science

Blue Plan	August		September			October			November			December			January			February			March			April			May			June			July																																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52																				
	Clerkship Phase																																				Post-Clerkship Phase																																			
Year 3	Clerkship Phase																					Winter Break	Clerkship Phase																					Break	Year 4 36 weeks Required + Step 2 CK & CS																											
	Post-Clerkship Phase																																																																							
Year 4	Year 4 36 weeks Required + Step 2 CK & CS																					Winter Break	Year 4 36 weeks Required + Step 2 CK & CS																																																	

Special Study Modules (SSMs) do not have a distinct role in the new curriculum. Current SSMs could be converted into a) advanced clinical clerkships, b) clinical didactics, or c) part of the specialty-specific biomedical science experience in the Transition to Residency course.

Students can enroll in more content than this if they wish but are not required to do so for graduation. This buffer allows more time for remediation efforts or alternative student interests if needed.

VI. The Gold Plan: “Let’s Postpone Step 1”

Gold e¹ Pre-Clerkship Curriculum (74 weeks, starting August 2021 and finishing December 2022)

The philosophy and pedagogical approach of the pre-clerkship curriculum are largely similar to those described in the Blue Plan. However, the Gold Plan pre-clerkship period is shortened by 17 weeks (as compared to the Blue Plan) to end with winter break of the second year, allowing students to immediately begin clerkships at the start of January of their second year. This earlier start allows for a faster immersion in clinical science and provides a time buffer after core clerkships are completed should students need to repeat USMLE Step 1. In comparison to the Blue Plan, the 17 weeks eliminated include 8 weeks of Step 1 study time, 4 weeks of summer break, 1 week of human architecture, 1 week of molecular and cellular medicine, 1 week of cardiology/pulmonology/nephrology, 1 week of endocrinology/ gastroenterology/reproduction, and 1 week of brain and behavior. Hematology content shifts from Cardiology, Pulmonology, and Nephrology to merge with Pathogens and Host Defense so that the first winter break does not interrupt a course. Skin, Bones, and Capstones is positioned as the final course, as the second winter break no longer interrupts the Brain and Behavior course as occurs in the Blue Plan.

Gold Plan	August			September			October			November			December			January			February			March			April			May			June			July																														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52												
	Pre-Clerkship Phase																																																															
Year 1	Human Architecture (7 wks)							Molecular and Cellular Medicine (5 wks)							Interession	Pathogens, Host Defense, and Blood (7wks)							Winter Break	Cardiology, Pulmonology, and Nephrology (16 weeks)									Interession	Spring Break	Cardiology, Pulmonology, and Nephrology (16 weeks)									Summer Break (4 wks)				Endocrinology, Gastroenterology, and Reproduction (15 wks)									Interession							
	Clerkship Phase																																																															
Year 2	Endocrinology, Gastroenterology, and Reproduction (15 wks)															Brain and Behavior (7 wks)							Interession	Skin, Bones, and Capstones (3 wks)			Transition to Clerkship (1 wk)	Winter Break	74 weeks total: - 61 weeks core content - 9 weeks vacation - 4 weeks interession - 1 week T2C																																			
	Clerkship Phase																																																															

The sample weekly schedule and recommended active learning methods remain the same as in the Blue Plan.

Gold e² Clerkship Curriculum (52 weeks, starting January 2023 and finishing December 2023)

The guiding principles and clerkship schedule remain the same as in the Blue Plan.

Clerkship Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
	Internal Medicine						Interession	Surgery						Summer Break	Interession	Pediatrics						Interession	Ob/Gyn						Interession	Psychiatry						Winter Break	Interession	Family Medicine						Interession	Selectives							

To provide students with additional Step 1 preparatory support, consideration may be given to offering an optional 2-4 week Step 1 content consolidation clinical didactic in the post-clerkship phase and/or optional biomedical/clinical/health systems science review sessions one evening per week during the clerkship period. In deciding whether to offer either of these, it will be important to weigh student interest against the faculty time needed to prepare and deliver this content.

Gold e³ Post-Clerkship Curriculum (69 weeks total with 40 weeks of required content, starting January 2024 and finishing April 2025, when T2C is completed)

This phase has guiding principles similar to those in the corresponding Blue Plan phase. In the Gold Plan post-clerkship period, however, students will have 17 more weeks in which to study for and take Step 1 and complete an additional 4 weeks of content.

Students will need to complete the following requirements to fulfill the required **40 weeks** of content. Up to 12 weeks can be clinical didactics, and the remaining 28 weeks must include provision of direct patient care. Required content for this phase is described below, with new additions to our current requirements highlighted in green.

- 4 wks Emergency Medicine Acting Internship
- 4 wks Inpatient Acting Internship at UCDCM in core clerkship department
- 4 wks Inpatient or Ambulatory Acting Internship at UCDCM or away
- 4 wks ICU Acting Internship (also counts for an AI requirement)
- 4 wks Neurology Advanced Clinical Clerkship
- 4 wks Area Scholarly Concentration Clinical Didactic for students who complete a project (Doctoring 4 would become a “medical education” experience in this category)
- 16 wks advanced clinical clerkships/clinical didactics if also completing area scholarly concentration; 20 wks if no area scholarly concentration chosen
 - 4 wks Transition to Residency, which includes specialty-specific biomedical science

Students can enroll in more content than this but are not required to do so for graduation. This buffer allows more time for remediation efforts or alternative student interests if needed.

Gold Plan	August				September				October				November				December				January				February				March				April				May				June				July								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	
	Clerkship Phase																						Post-Clerkship Phase																														
Year 3	Clerkship Phase																						Winter Break	Year 4 40 weeks Required + Step 1 + Step 2 CK & CS																													
																							Post-Clerkship Phase																														
Year 4	Year 4 40 weeks Required + Step 1 + Step 2 CK & CS																						Winter Break	Year 4 40 weeks Required + Step 1 + Step 2 CK & CS																													

VII. Benefits and Drawbacks to Moving USMLE Step 1

The timing of the USMLE Step 1 study period and exam within the curriculum has been a topic of animated discussion in medical schools across the country. Many schools now initiating curriculum redesign are shifting USMLE Step 1 as a key element of their new curricula. As of 2017-2018, 17 medical schools have shifted USMLE Step 1 from its traditional location at the end of the pre-clerkship phase to the end of the core clerkship phase. An additional 4 schools allow students to take USMLE Step 1 at any point in the curriculum before graduation ([Appendix 10](#)).

The literature contains multiple published reports and analyses of the benefits and drawbacks of moving USMLE Step 1 [here](#), [here](#), and [here](#). General summaries of the benefits, neutral aspects, and drawbacks experienced by other schools who moved Step 1 are described below. Although the literature has been useful in this regard, it is important to note that the experiences of other schools may not be generalizable to our own school and student body.

Benefits to moving USMLE Step 1

- Greater student engagement in pre-clerkship curriculum; currently, students are very focused on a “[parallel curriculum](#)” of commercial board review products
- Potential increase in Step 1 scores
- Potential for fewer Step 1 failures
- Shelf exams offer preparation for Step 1, rather than the reverse (many schools adjust the passing minimum for shelf exams accordingly)
- Some students find the content on USMLE Step 1 and Step 2CK to overlap enough for increased studying efficiency, and purposefully take the exams close together
- Greater emphasis on integrating biomedical science in the clerkship/post-clerkship phases

Neutral (including mixed benefit-drawback) aspects to moving USMLE Step 1

- Students would start clerkships without having consolidated their knowledge by studying for Step 1, which helps with clerkship scheduling bottlenecks but may place increased teaching burden on clinical faculty

- Shortening of pre-clerkship phase is balanced with lengthening of post-clerkship phase

Drawbacks to moving USMLE Step 1

- Students complete clerkships without knowing their Step 1 score (and, to some extent, their competitiveness for particular residencies or away rotations)
- Students can experience stress later in clerkship year as the Step 1 study period nears
- Incorporating biomedical science in the clerkship year can be challenging given the competing demands
- Summer break in the pre-clerkship curriculum becomes shorter, limiting extramural opportunities
- No clear mandate at UCDSOM for using time transferred from the pre-clerkship/clerkship phases to the post-clerkship phase (e.g., for a long research project, community-based project, dual degree), though this approach better allows for time-variable progression

Another important point to consider in weighing this issue is the Invitational Conference on USMLE Scoring ([InCUS](#)), in which key stakeholders have been discussing USMLE scoring, its use in undergraduate and graduate education (including as a screening metric for residency programs), and whether USMLE Step 1 in particular should become pass/fail or a variant thereof. Some pros and cons of changing USMLE Step 1 to a pass/fail format are provided [here](#). The NBME's recommendations for published literature on this topic can be found [here](#) and [here](#). It is anticipated that a decision will be rendered in the near future (projected timeline of winter 2019-2020).

Should USMLE Step 1 become pass/fail, some of the advantages of the Gold Plan may not be realized. However, the potential reduction in Step 1 failures and potential studying efficiency in taking Step 1 and Step 2CK in close proximity would still be possible benefits worth considering.

VIII. Curricular Oversight and Structural Support

Both the Blue and Gold curriculum plans have financial and logistical implications that are beyond the charge of this committee. Our recommendations are outlined below for consideration by the Vice Chancellor, Dean, and faculty.

Key guiding principles in our recommended approach to curricular oversight include departmental and faculty inclusiveness, collaboration, integration, and learner well-being, returning to the aim of creating learner-centered education that leads to patient-centered care.

We propose that the current large number of pre-clerkship courses (more than 30, each typically overseen by a single department) be merged into the following highly integrated courses: Human Architecture and Function, Molecular and Cellular Medicine, Pathogens and Host Defense, [Hematology]/Cardiology/ Pulmonology/Nephrology, Endocrinology/ Gastroenterology/Reproduction, Brain and Behavior, and Skin/Bones/Capstones. We propose

that all departments share ownership of these pre-clerkship courses. This structure would allow for better alignment with our mission and three pillars. Additionally, this structure would exemplify our guiding principles as follows: a one pass curriculum with well-designed foundational and longitudinal content facilitates greater integration and inclusiveness; spiral learning effectively builds upon previously acquired knowledge, creating efficiency and reducing learner cognitive load; assessments with improved integration better reflect the realities of clinical medicine and USMLE exams; and, greater usage of our large pool of faculty expertise allows for increased inclusiveness and collaboration.

We recommend that when selecting a new course director, a call be put out to all faculty, outlining the course content and the course director responsibilities. All faculty members are eligible to apply with the approval of their department chairs. Applicants are then reviewed, interviewed, and selected by the CEP chair, one CEP representative, and the curriculum dean. (This model is currently in use at the University of California at Los Angeles School of Medicine.)

To ensure we have appropriate representation for each pillar of our curricular framework, pre-clerkship courses will have three co-course director faculty: one from biomedical science, one from clinical science, and one from health systems science. Together, these co-course directors represent the faculty from each of those arenas within the course, and collaborate in course administration, including scheduling, content organization, content integration, assessment, and communication. Consideration could be given to merging the role of the block liaison with the course director position, given the overlap in some of the responsibilities.

We encourage CEP to select faculty from different departments to serve as course directors, to ensure inclusion and representation of as many departments as possible in overseeing the curriculum. If CEP determines that increasing the range and number of faculty exposed to the course director role is beneficial, then consideration may be given to implementing modified “term limits” for the course director role, with a periodic call being put out for applicants while recognizing that “termed out” faculty may stay on if other qualified candidates are not identified.

Thread leaders will be preserved in this model, with discipline (e.g., anatomy, physiology, pharmacology, pathology, clinical skills, clinical experiences) leaders introduced as well. Thread and discipline leaders will collaborate with course directors to ensure that their content is appropriately incorporated and developed over the four years of the curriculum. Both thread and discipline leaders will take a primary role in planning and teaching their content. CEP will select thread and discipline leaders through a mechanism similar to that used for course directors. Faculty may serve in more than one educational role (e.g., course director and discipline leader, or course director and thread leader, or thread leader and discipline leader) if deemed appropriate by CEP.

Needed Resources

- Turning Point clickers and subscription for Peer Instruction (starting with 2020-2021); staff assistance with Peer Instruction sessions
- Curriculum mapping software and staff/faculty time to identify and enter information
- Teaching awards/recognition for faculty and residents who create positive learning environments or excel in educational innovation/integration
- Problem-Based Learning facilitator training (external consultants)
- Direct funding for faculty time for pre-clerkship, clerkship, and post-clerkship course directors, thread leaders, discipline leaders, scholarly concentration mentors
- Modification of faculty course, thread, and discipline leader funding formula to incorporate more than course hours (with greater emphasis on elements such as integration, active learning/innovation, and peer evaluation)
- Continued funding for academic coaches and master educators
- Interim funding/protected time for faculty to help develop new curriculum
- Dean or Director of Institutional Effectiveness (assessment and evaluation)
- Director of Workplace Based Assessment (EPAs) (facilitates incorporation into curriculum)
- Director of Interprofessional Education (works with SOM, SON, and allied health programs to create and implement curricular content)
- Director of Electives (consults with elective and selective course directors, assists with course approval process, informs/consults with students about options)
- Director of Regional Affiliate Engagement (clinical site recruitment and retention, site visits, and faculty development)
- Course, faculty, and student evaluation updates before the new curriculum is implemented (to allow for pre- and post-implementation comparisons)
- Reserved office space for Davis-based faculty to share for office hours and coursework preparation as needed

Optional Resources

- Additional Step 1 preparatory resources (e.g., AMBOSS or Osmosis) for potential curricular incorporation
- Scribe training (completion before matriculation, as in ACE-PC)
- CME offset funding for community preceptors to benefit from reduced/free UCD CME content, including in pain medicine

IX. Benchmarks to Evaluate the New Curriculum

Establishing and monitoring benchmarks within our curriculum will be important from a continuous quality improvement standpoint. We will need to understand the successes within the curriculum, as well as the curricular components that warrant revision or refinement. To

accomplish this, we propose usage of a “plan-do-study-act” model that includes tracking the efficacy of any interventions for the benchmarks below.

- Graduation Competencies (GC)
 - Map courses and sessions to GC framework.
 - Track and report student attainment of GC milestones.
- LCME Curricular Element Compliance
 - Review curriculum in context of elements most commonly cited.
 - Review curriculum in context of elements most challenging for our institution.
 - Review curriculum in context of elements most recently introduced/modified.
- AAMC Graduation Questionnaire
 - Track and report annual trends.
 - Correlate results with feedback from courses and curricular phases.
- Student Feedback (faculty, course, and curriculum evaluations)
 - Track and report annual trends, including faculty response.
- Faculty Satisfaction
 - Track and report satisfaction with curriculum (e.g., content, sequence, integration, ease of modifying content, course leadership).
 - Track and report satisfaction with teaching experience (e.g., student engagement and learning, collaboration with other faculty).
 - Track and report satisfaction with institutionally-provided support (e.g., staff, technology tools, faculty development, funding).
- Curricular Content and Delivery
 - Incorporate three pillars, five threads, and core clinical presentations.
 - Align with [USMLE Content Outline](#) and national organization learning objectives and competencies as appropriate.
 - Conduct and report periodic faculty peer review.
 - Monitor quality, type, and number of active learning sessions.
 - Monitor outcomes of early clinical exposure in pre-clerkship phase.
 - Monitor adherence to weekly contact hours policy in pre-clerkship phase.
 - Monitor adherence to duty hours policy in clerkship and post-clerkship phases.
- Student progression and development
 - Monitor student progression through coursework.
 - Monitor student preparedness for clerkships and post-clerkship period, including clinical skills acquisition, and efficacy of any remediation efforts.
 - Monitor student accomplishment of expected clinical encounters/procedures at appropriate levels of responsibility.
 - Monitor outcomes of early specialty exposure in pre-clerkship phase.
 - Monitor formal availability and participation in mentorship and research opportunities.
 - Monitor participation in and outcomes of areas of scholarly concentration.

- Monitor measures of student wellness in collaboration with Student Affairs.
- Standardized Exam Performance – Step 1, Step 2 CK, Step 2 CS, and CPX
 - Report annual trends in USMLE and CPX performance.
 - Compare average class performance to anticipated class performance.
- Residency and Match Outcomes
 - Report residency match rates for our students.
 - Report students who matched into discipline of choice.
 - Survey program directors regarding graduate preparedness as interns.
 - Survey graduates regarding UME experience and preparation for residency.

X. Next Steps After Plan Selection

GENERAL

- Identify which elements to include for phased implementation in summer 2020, with remainder to be implemented in summer 2021 (class of 2025).
- Complete graduation competency revision.
- Select and implement curriculum mapping software.
- Map current curriculum, including all course and session learning objectives, for identification of areas of overlap, potential integration, and redundancy.
- Create workgroup to define the core clinical presentations.
- Create workgroup to organize health systems science content across all four years, including health and humanity, population health, and medical informatics.
- Identify leaders of areas of scholarly concentration and create workgroup to standardize implementation across all four years.
- Create workgroup to plan interprofessional education content across all four years.
- Conduct biomedical science symposium in Davis with exploration of how learning biomedical science improves critical thinking and clinical reasoning skills.
- Strengthen faculty development in medical education.
- Identify published sets of learning objectives/competencies from different national organizations, compare them with our current curricular learning objectives to determine any learning gaps or opportunities, and create content to address those considered most important.
- Coordinate with PRIME leadership to determine how PRIME tracks will vary ([Appendix 10](#)).

PRE-CLERKSHIP STAGE

- Create multiple biomedical/clinical/health systems science workgroups to plan curriculum week-by-week, starting with the first year.
- Create workgroup to further plan intersessions.

- Create workgroup to plan capstone cases by selecting complex diseases with dermatologic, musculoskeletal, ophthalmologic, otolaryngologic, or neurologic manifestations.
- Define longitudinal clinical experience competencies and objectives and select and develop preceptors accordingly.
- Pair pre-clerkship course directors with clerkship directors for improved vertical integration and preparation for clerkships.

CLERKSHIP STAGE

- Create workgroup to plan biomedical science reinforcement/integration with clerkships once Blue or Gold plan is selected. This may include optional weeknight sessions.
- Create workgroup to further plan intersession content in conjunction with new intersession course directors.
- Create workgroup to determine best approach for Doctoring 3 in new curriculum.
- Determine use of workplace-based assessment (including EPAs) and PBLIs, CPX, and OSCEs in student assessment and plan timing and implementation.
- Identify and address clinical site placement issues.
- Expand “selectives” offered.

POST-CLERKSHIP STAGE

- Create workgroup (including residency program directors/associate program directors and residents who recently trained here) to identify post-clerkship coursework and biomedical science content most useful to each of the different disciplines in medicine.
- Standardize acting internship expectations.
- Expand ICU acting internship capacity.
- Develop e-learning clinical didactic courses.
- Plan appropriate biomedical science content and integrate it with transition to residency content by specialty.
- Identify approaches to incorporate health systems science into this period.

XI. CONCLUSION

In conclusion, we present two curricular plans for consideration. We recognize that no one curriculum can address all learner or patient needs, or solve all challenges faced in modern medicine. Furthermore, we acknowledge that these curricula will be delivered in a unique manner by a unique faculty to a unique body of students, and therefore definitive outcomes cannot be guaranteed regardless of the reported experiences of other medical schools. Nonetheless, we believe both plans offer substantive merit. Both plans share similar guiding principles, which were developed based on our school mission, input from our health sciences campus community (including faculty, resident physicians, staff, and students), and evolving

national expectations in medical education. The Blue plan preserves the timing of the Step 1 examination before clerkships and maintains the current distribution of time for each curricular phase. The Gold plan shifts the timing of the Step 1 examination to be after clerkships, thereby shortening the pre-clerkship phase and lengthening the post-clerkship phase. We offer no formal opinion on the superiority of either plan. As the plans came together in the final stages of the process, the CDT reviewed them in their entirety. Although occasional details were not always agreed upon unanimously, each CDT member endorsed the vast majority of the plan content described herein.

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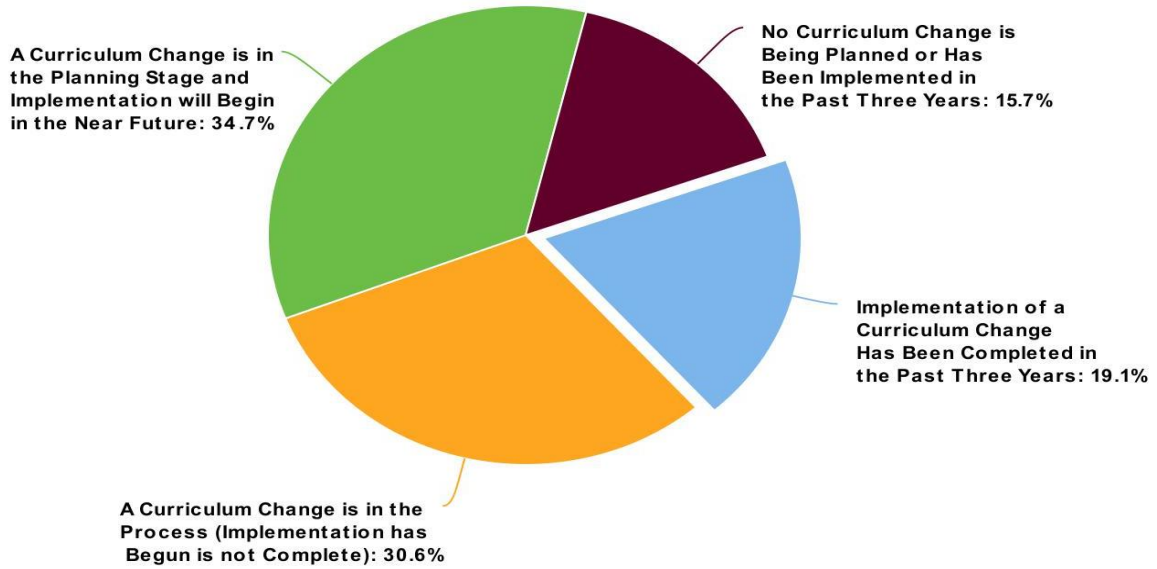
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XIII. APPENDICES

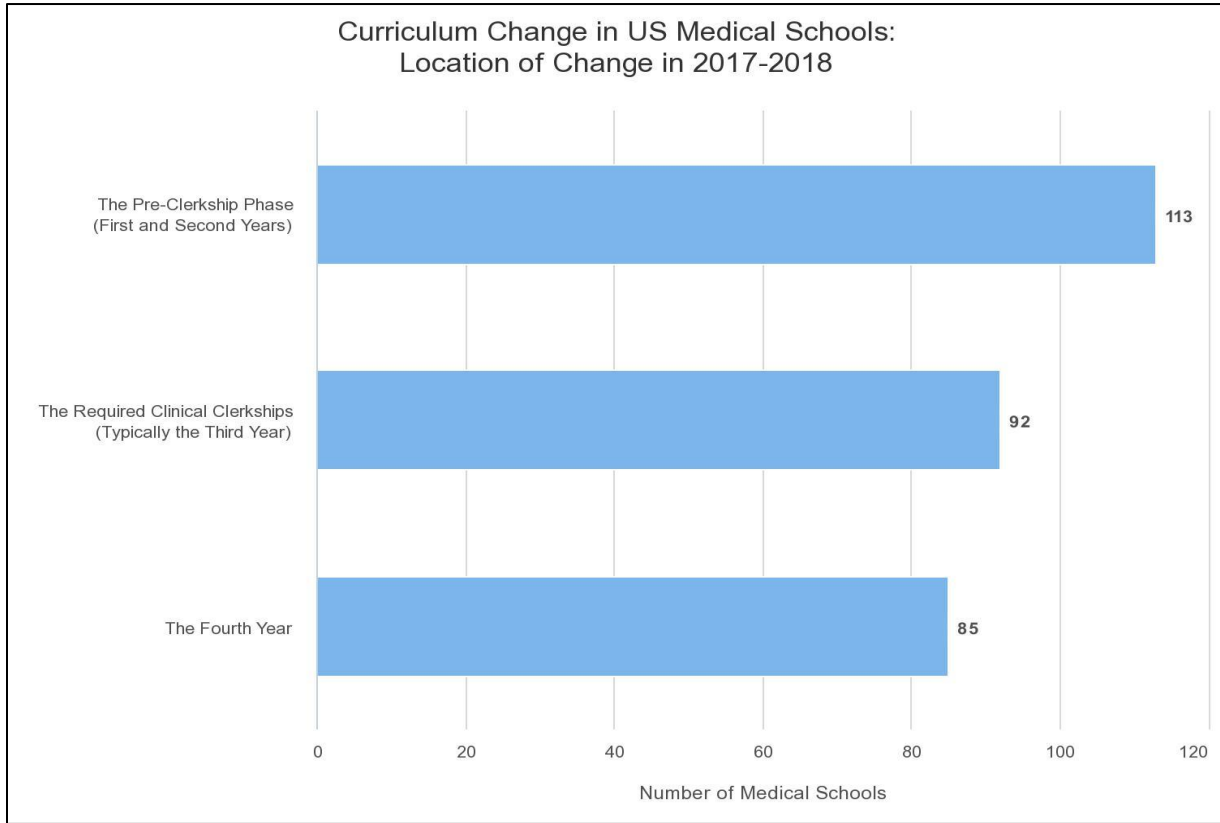
Appendix 1 – Implementation of Curricular Change - [AAMC Source](#)

Curriculum Change in US Medical Schools:
Implementation of Change in 2017-2018



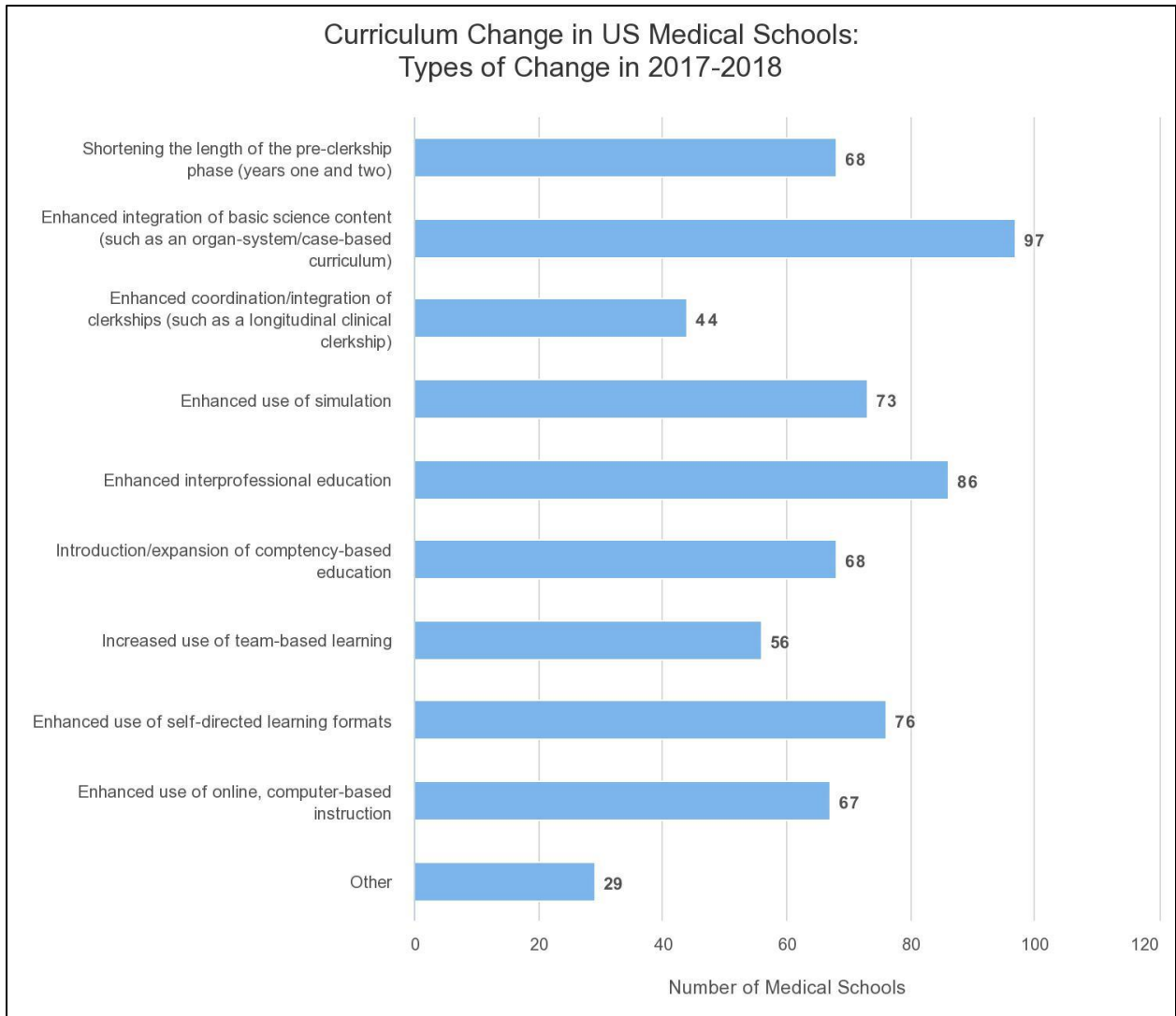
INTERNATIONAL

Appendix 2 – Location of Curriculum Change - [AAMC Source](#)



INTERNAL

Appendix 3 – Types of Curricular Change - [AAMC Source](#)



INTELLECT

Appendix 4 – Curriculum Design Team Roster

Name	Specialty	Title	Relevant Roles (Past or Present)
Kristin A. Olson, MD	Pathology	Associate Dean for Curriculum and Medical Education	IOR for General and Systemic Pathology; Block Council Chair
Joanna Arnold, PhD	Education	Staff	Director of Office of Student Learning and Educational Resources
Paul Aronowitz, MD	Internal medicine	Faculty	Clerkship director for internal medicine; Master Educator for Pre-Clerkship Phase
Hillary Campbell, MD, MPH	Internal medicine	Volunteer Faculty	ACE-PC collaborator, Director of Medical Education for Kaiser Permanente North Valley
Melody Y. Hou, MD, MPH	Obstetrics and Gynecology	Faculty	Clerkship director for obstetrics/gynecology ; Master Educator for Clerkship Phase; Third Year IOR Lead
Russell Jones, MD	Emergency medicine	Faculty	Clerkship director for emergency medicine; Master Educator for Post-Clerkship Phase
Joseph Kim, MD	Internal medicine/psychiatry	Resident physician	
Santiago Lombo Luque, BA		Medical student	
Theresa Murdock-Vlautin, MD	Pediatrics	Faculty	Doctoring/Clinical Skills lead
Amanda Phares, MD	Surgery	Resident physician	Medical education emphasis
Jennifer Plant, MD, MEd	Pediatrics	Faculty	Pediatrics clerkship director, Chair of Fourth Year Oversight Committee

Luis Fernando Santana, PhD	Physiology	Department Chair and Faculty	Master Educator for Biomedical Science, regular participant in Physiology course
Andres Sciolla, MD	Psychiatry	Faculty	Doctoring lead, Behavioral Sciences lead
Barbara Shacklett, PhD	Immunology	Faculty	IOR for Medical Immunology
Lane Squires, MD	Otolaryngology	Faculty	Participant in pre-clerkship teaching
Sarah Westcott, BA		Medical student	CEP representative
Marjorie Westervelt, MPH	Education	Staff	Director of Curriculum and Educational Technology
Barton Wise, MD, MSc	Internal medicine and research	Faculty	IOR for Musculoskeletal System course (rheumatology component)

Appendix 5 – Patient- and Learner-Centered Forum Summaries

Patient-Centered Community Forum Recommendation	CDT Response
Sign/symptom presentation emphasis	UCD Core Clinical Presentations
Team-based care and interprofessional education (IPE)	More IPE in integrated courses/ intersessions with emphasis on experiential learning with varied health care professions; additional opportunities for sharing areas of scholarly concentration and e-learning content
Health care advocacy/community needs	Strengthen baseline curriculum for all (graduation competencies) and offer area of scholarly concentration for those with additional interest
Social determinants of health	Strengthen baseline curriculum for all through new thread and offer area of scholarly concentration for those with additional interest
Cultural competence and humility	Strengthen baseline curriculum for all
Health systems science	Third pillar of curriculum (integrated)
Patient safety	Strengthen baseline curriculum for all (graduation competencies) and offer area of scholarly concentration for those with additional interest
Earlier clinical experiences	Longitudinal clinical experience now begins in first year
Communication and professionalism	Strengthen baseline curriculum for all (graduation competencies)
Whole patient emphasis	Strengthen baseline curriculum for all through new threads (Stages of Life, Preventive Medicine) and through use of patient panels, more holistic case-based learning
Family caregiver experience	Strengthen baseline curriculum for all through new thread (Stages of Life) and through use of patient/caregiver panels, more holistic case-based learning
Simulation experiences/standardized patients	Detailed round of redesign (upcoming)

Learner Centered Community Forum Recommended Emphasis	CDT Response
Better content integration	Three pillars with “one pass” integrated curriculum; greater department inclusivity with merged courses
Active learning	More TBLs, PBLs, and Peer Instruction
More competency-based, less time-based	Emphasis on graduation competencies, workplace-based assessment (e.g., EPAs), and more opportunities for remediation/acceleration
Flexibility, self-directed learning	Standardized weekly schedule to allow for more self-directed learning/flexible time, intersessions with different options, increased selectives to allow for exploration
More low-stakes practice for each course	Weekly NBME style quizzes (formative)
Earlier clinical experiences, mentoring	Longitudinal clinical experience in pre-clerkship period, academic coaches, early exposure to various specialties/disciplines
Team-based care and IPE	More IPE in integrated courses/ intersessions with emphasis on experiential learning with varied health care professions; additional opportunities for sharing areas of scholarly concentration and e-learning content
Health advocacy/community needs	Strengthen baseline curriculum for all and offer area of scholarly concentration for those with additional interest
Cultural competence and humility	Strengthen baseline curriculum for all (graduation competencies)
More faculty development	Partnership with Academic Personnel in creating robust medical education faculty and resident development modules
Individual learning plans	Under consideration by Student Affairs
Greater Step 1 focus for content	Detailed round of redesign (upcoming); NBME exam usage will be encouraged; merging of courses will allow for assessments that better reflect Step 1 and clinical medicine
Technology emphasis/future preparation	Detailed round of redesign (upcoming); potential for medical informatics to become area of scholarly concentration
Simulation experiences/standardized patients	Detailed round of redesign (upcoming)

Appendix 6 – Neurology Clerkship Petitions

May 18, 2019

Dear UC Davis School of Medicine Curriculum Design Committee:

It is with great enthusiasm, passion and urgency that we, the Student Interest Group in Neurology, write to you for consideration of a required Neurology clerkship in the medical education curriculum.

In recent years, the field of Neurology has arguably reached a “golden age.” Tremendous advancements in clinical neuroscience have led to better understandings of previously unknown mechanisms of disease pathology, and development of gene therapies and biologics, some even with curative potential. It is indeed an exciting time to learn about the changes and developments in the field, which has direct applicability to clinical practice. However, in parallel with this increase in research breakthroughs and treatments, comes an aging Baby Boomer population creating an increasing demand for Neurologists. As this population ages, there will be a higher prevalence of Neurologic conditions like dementia and stroke that affects this population. In fact, according to the most recent 2019 *Lancet Neurology* Global Burden of Disease report, Neurological disorders were calculated to be the leading cause of disability worldwide, with 276 million (11.6%) of global Disability Adjusted Life Years, and the second leading cause of death after heart disease (Carroll, 2019). This requires an abundance of neurologists worldwide.

While the demand is great, the field of Neurology continues to experience a nationally recognized physician shortage. A 2013 study by the American Academy of Neurology projected a shortage of 19% (21, 440 Neurologists), by 2025, which is an 8% increase from that of 2012 (Dall, 2013). This drastic discrepancy between need and availability can be mediated, though, at the undergraduate medical education level. Studies have found less than 2% of all allopathic US medical graduates end up matching into Neurology, a consistent trend since the 1980's with highest levels in 2018, and 2019, at 1.6% (NRMP, 2019). This low turnover is thought to be influenced by inadequate exposure to the field during medical education, as well as an attitude of “neurophobia” deterring students from learning more or entering the field (Zinchuk, 2010).

But it is not just a shortage of Neurologists during a time when the field is becoming so inundated that compels us to take action. Neurological complaints are also pervasive through many different fields, and solid knowledge of screening neurologic exam skills, warning signs for neurologic emergencies, and content of the clinical specialty as well as exposure to relevant patients and cases will be tremendously beneficial for student doctor and future physician.

Neurologic complaints make up a large percentage of patient visits in primary care fields and thus, are major drivers of healthcare utilization in the US. A 2013 retrospective chart review study examining 142, 377 patients in primary care settings found back pain to account for 23.9% of all visits, chronic neurologic disorders to be 19.75% of all visits, and headaches, including migraines to account for 13.99% of all visits (St Sauver, 2013). Additionally, as our understanding of autism, and underlying causes of epilepsies increases with more research in genetics and neurosciences, it is becoming a necessary portion of pediatrics to manage children with neurologic and related conditions as well. Thus, it would be very important to include required Neurology related educational experiences in the clinical curriculum. Taken together, a high demand, low supply of neurologists, as well as pervasiveness of neurology in

other medical specialties, provide a compelling reason to incorporate a well-developed, comprehensive neurology curriculum in medical education.

We urge you to consider creating a core neurology clerkship. It would benefit UC Davis students both in the immediate time frame, by providing an important knowledge base and patient exposures, but also create a long-term scalable impact by producing more physicians regardless of specialty, who are better equipped to manage the growing number of patients with neurologic conditions. Our Neurology department has expanded greatly in recent years, now with a faculty of 42 clinicians and researchers. Our residency program, too, has expanded its spots - testimony to the successful teaching and enriching environment which encourages trainees to succeed. The department is ranked among the Top 30 Neurology and Neurosurgery departments, and is recognized for its epilepsy center, Alzheimer's center, as well as subspecialty-related research and focus on certain conditions like Huntington's disease, Myasthenia Gravis, even housing the nation's experts in some of these areas. Given this wealth of intellect, mentorship and opportunities for learners through the department, it would be a pity to not be exposed to this experience during medical school.

We are confident in the UC Davis School of Medicine's ability to provide the best education and its commitment to developing the next generation of excellent doctors. Thus, with a fantastic Neurology department of excellent clinicians and faculty, we are certain the UC Davis School of Medicine can greatly augment clinical education with the incorporation of a mandatory Neurology clerkship in its new curriculum.

Sincerely,

UC Davis School of Medicine, Student Interest Group in Neurology (SIGN)

Aditi Trivedi, MD, UCDSOM, Class of 2019 SIGN Officer

Jacob Loeffler, BS MS4, Class of 2020 SIGN Officer

Sy Clark, BAS, MS4, Class of 2020 SIGN Officer

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December 16, 2019

To: UC Davis Curriculum Design Committee

According to the Global Burden of Disease Study, published in *The Lancet*, neurological disorders ranked as the leading cause group of disability-adjusted life-years, and second leading cause group of deaths, comprising 16.8% of global deaths (Lancet Neurol 2017; 16: 877-97). Globally, the burden of neurologic disorders has increased substantially over the past 25 years because of expanding population and aging. Epilepsy, Alzheimer’s disease, Parkinson’s disease, multiple sclerosis, migraine, and stroke, rank highest in prevalence, deaths, and disability. The number of patients who will need care by clinicians with expertise in neurological conditions will continue to grow in the coming decades.

Policy makers and health institutions must be aware of these trends to provide adequate patient care. To address this, Department of Neurology at UC Davis has expanded dramatically over the past 5 years to nearly 35 clinical faculty, 20 research faculty, and 5 volunteer clinical faculty. We are nationally recognized for clinical care and research, with experts in 14 subspecialties, including epilepsy, Alzheimer’s disease and dementia, Huntington’s disease, multiple sclerosis, Parkinson’s disease, neuromuscular disease, child neurology, stroke, and traumatic brain injury. Our department is ranked by US News and World Report as one of the top 50 Neurology-Neurosurgery programs in the US. In 2018, the department was ranked 16 in NIH funding for US medical schools, receiving more than \$16M in medical research funds.

As a premier medical school educating and preparing physicians of the future, UC Davis School of Medicine must provide strong, comprehensive teaching in clinical neurology. At present, our high caliber medical students can graduate without any formal clerkship rotation through our stroke service, outpatient clinics, neurology wards, or neuro-ICU.

As the clerkship director of the NEU 450/452 electives (Clinical Adult Neurology Clerkship and Sub-Internship in neurology) for the past 10 years, I have amassed experience in the education of neurologic disorders, both at the bedside and in the classroom. I have learned which teaching strategies work best for each learner subtype, and have created a customized educational experience for each rotator. As a result, our courses are always ranked highly; student evaluations have been consistently very positive and most students agree that neurology is one of the most useful and high yield electives at UCD. We have been able to arm a subset of UC Davis graduates with a solid foundation in neurology, to strengthen their future careers in internal medicine, psychiatry, PM&R, family practice, and beyond. Most excitingly, we have been able to inspire some very special students to pursue a career in the neurosciences. Unfortunately, as an elective, we have only been able to teach approximately 25-30% of each graduating class. We have received consistent feedback that our clinical rotation should not only be a requirement, but should be integrated into the third year of medical school.

Becoming a required clerkship for all UC Davis medical students will require increased teaching resources and revamping of our current curriculum. Considerable thought and planning has gone into

this plan, and as a department, we are prepared to expand the breadth and depth of our teaching to accommodate a larger volume of learners. Together with a newly appointed assistant clerkship director, we will create a panel of core educators to provide face-to-face teaching across the spectrum of neurologic disease. We will integrate small group didactics, teaching rounds, simulation lab learning, Google glass, and bedside exams, to cover the material from various angles. A very busy ER consult service will provide hands-on teaching of the management of neurologic emergencies. Our various partners will provide experiences that students can only gain from being at a large academic center, such as pediatric neurology, neuropsychology, neurosurgery, deep brain stimulation, epilepsy monitoring, neurophysiology, lumbar puncture, botulinum toxin, neurointensive care, acute stroke unit, etc. Students rotating through our Huntington's and Ob-gyn/Epilepsy clinics learn first-hand, the benefits of the multidisciplinary patient care approach that is a model for future health care. Rather than outsource teaching to neighboring institutions, keeping UC Davis students on site will ensure the highest quality and diversity of learning. By expanding the learning opportunities within our hospital and outpatient clinics, we will be able to absorb the projected student body growth.

Ultimately, the Department of Neurology is well positioned and excited to take on the challenge of creating a robust, memorable, high yield, 4 week experience for all medical students at UC Davis. We feel we would have the greatest impact on students' education in the third year. As the curriculum design committee finalizes the schedule for the best student experience for UC Davis, we thank you for your consideration.

Sincerely,

Norika Malhado-Chang, MD
Associate Professor of Neurology
Division of Movement Disorders
Clerkship Director NEU 450/452
UC Davis School of Medicine
Department of Neurology
3160 Folsom Blvd, suite 2100
Sacramento, CA 95816
nmalhadochang@ucdavis.edu

Appendix 7 – Threads Survey Results Summary

A list of potential thread topics was developed from a combination of SOM community input and a review of common thread topics in medical schools nationwide. Survey respondents were asked to rate each thread in terms on importance, and to select the seven threads most essential to include. The primary question contains two components; one to rate the importance of each thread and one to rank order the threads considered most essential to include. Survey results for students are shown for students and “colleagues” separately. Colleagues include all professional respondents (staff, residents, faculty, and institutional leaders).

The survey was comprised of four questions designed to elicit opinions about which topics are of highest priority to become formal threads in a new curriculum. Respondents were asked to:

1. Rate the importance of each thread using a 5-point Likert scale;
2. Vote for the 7 threads they would consider most important to include;
3. Provide feedback about whether and how any threads could be divided or merged; and
4. Provide any other feedback.

The survey was sent to over 2300 students, staff, faculty, residents, and institutional leaders.

The following 10 threads were placed in the top 7 most important as measured by *either* a top-7 rating of importance or top-7 % votes to include in the top 7, by *either* students or colleagues. These four rankings were summed to obtain a composite rank of importance. The top ten scoring threads are listed below.

1. Diagnostic Medicine (including laboratory test interpretation and radiologic imaging)
2. High-Value Med Care, Evidence-Based Med and Life-long Learn
3. Care for Vulnerable and Socioeconomically Disadvantaged Rural and Urban Populations (including health disparities)
4. Interpersonal and Communication Skills
5. Disability/Chronic Illness, Palliative Care, and Death and Dying
6. Cultural Competence/Humility
7. Nutrition/ Exercise/ Obesity/ Alcohol/ Tobacco/ Sleep/Wellness
8. Health Care Across Stages of Life (including pediatrics, women’s health, men’s health, and geriatrics)
9. Social Determinants of Health
10. Professionalism

There is overall high agreement between students and colleagues and across measures (mean ratings and % of votes to place thread in the top 7). There were no threads with high, or even moderate, disagreement across role or measure.

Topics highlighted in yellow were selected by the CDT as longitudinal curricular threads that will be woven throughout the three curricular phases. Topics #3 and #9 are merged, and topics

#5 and #8 are merged. These new four threads will join the recently established pain medicine thread.

The remaining non-highlighted topics are graduation competencies. The CDT recognized that these topics were very important to our community, but decided it was best to simply reinforce them within our curriculum through greater emphasis on the competencies rather than create topical redundancy with new, identically titled threads.

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Appendix 8 – Letter Regarding PRIME/ACE Programs in New Curriculum

Dr. Olson and the Curriculum Design Team –

On behalf of the leadership for the Rural PRIME, REACH PRIME, TEACH-MS and ACE-PC programs, we applaud your incredible work in crafting these innovative proposals for UCDSOM. We appreciate the opportunity to preview the proposals and consider how the new structures might align to complement the PRIME and ACE curricular pathways.

As you know, the mission of the PRIME and ACE programs is to train medical student leaders to identify, understand, and serve the unique health needs of California's rural, valley, and urban communities: Rural PRIME was founded about 12 years ago, followed by SJV (now REACH) PRIME and TEACH-MS. Started in 2014, ACE-PC students complete the MD program in 3 years prepared to enter residency in a primary care field. ACE-PC remains the only 3-year MD program on the west coast. Of the approximately 150 PRIME and ACE graduates to date, about 65% have entered a primary care Family Medicine, Pediatrics or Internal Medicine (nearly twice the national rate and contributing to UCDSOM's top 10 ranking for primary care nationally) and many seem to be practicing in rural and underserved areas (data still being analyzed). About 25% of each UCDSOM matriculating class is enrolled in a PRIME or ACE program, and most of these students are from disadvantaged backgrounds or communities historically under-represented in medicine. Key components of each program include early and on-going connection to their home communities (PRIMEs, TEACH-MS), peer cohort, and clinical field (ACE-PC); a focused parallel curriculum in each year including tailoring of Doctoring content to underserved care; and clerkship immersions in the underserved community of interest. Our experience with these programs have led us to develop COMPADRE, a collaboration with OHSU that will recruit and train students from the region between Sacramento and Portland to address the workforce shortages and poor health outcomes in their hometowns.

Our team is particularly excited to see the innovations toward early and longitudinal clinical training, intersessions, and areas of scholarly concentration (ASC), including care for underserved populations. These innovations will provide enhanced opportunities for our students to train in their communities of interest and gain additional skills and knowledge that they will need in the future. We look forward to the opportunity to work with your team to develop the next steps of the curriculum and identify possible modifications to promote continued success for the PRIME, TEACH-MS and ACE-PC students and the communities for which they are working hard to serve.

Sincerely,

Alicia, Mel and Tonya

Alicia Gonzalez-Flores, MD

Executive Director, PRIME Programs

Dept. of Internal Medicine

Melody Tran-Reina, MD

PRIME Pre-Clinical Curriculum Director

Assistant Clinical Professor

Department of Internal Medicine

Tonya Fancher MD MPH

Associate Dean, Workforce Innovation and Community Engagement

Interim Associate Dean, Student and Resident Diversity

Director, Center for a Diverse Healthcare Workforce

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Appendix 9 – Anatomy Course Recommendations from Amanda Phares, MD (Surgery resident with experience in UCD medical school and undergraduate anatomy coursework)

Based on my experiences learning and teaching anatomy using prosections and learning and teaching anatomy using dissection, I propose that cadaver dissection is a challenging (and often frustrating) way to learn anatomy for the first time but remains an important component of a high-quality anatomy course. We are considering changes to the curriculum such as moving the anatomy course into a foundations block to prepare students for a one-pass, organ-system-based program. With this plan, the foundations block would likely span 6-8 weeks. The anatomy course currently is taught over 13 weeks. By comparison, the undergraduate anatomy course is taught using prosections over 10 weeks with 2 3-hour labs per weeks with additional open lab hours for review. My suggestion to continue to provide a comprehensive anatomy education for medical students is to transition some of the lab time to prosection-based teaching while maintaining a dissection component. This change is supported by many of the student comments about the course. While students overwhelmingly love the anatomy course, they suggest decreasing the amount of dissection time to allow for more time to review dissected cadavers – their own and others.

An alternative argument would be to discontinue cadaver work entirely and use printed or digital resources. I believe that the ability to feel and move the structures and appreciate their relationships in space is valuable to the future physician. In addition, the value of dissection has been studied and includes opportunities to realize and experience anatomic variation, develop teamwork skills, face and process concepts of death and dying, and confront emotions associated with death. Studies of students' views toward dissection found that 91-95% of students reported dissection was necessary to learn anatomy (Snelling, 2003). A qualitative study by Flack and Nicholson in 2017 found that students “perceived that cadaveric dissection is an appropriate, valuable educational tool that effectively teaches real-life anatomy and normal variations, as well as a range of associated practical skills. They also believed that dissection helped them develop emotionally and professionally, preparing them for their careers as doctors.” Still, there are a number of alternative ways to learn anatomical structures. As new technologies become more popular, we will need to determine if the learning outcomes are equivalent between digital and cadaver-based programs.

The anatomy course currently includes instruction on embryology, radiology, and surface anatomy. With the restructuring of the curriculum, embryology could remain with anatomy in the foundations block or be divided up into the organ systems. I recommend that radiology including ultrasound be taught with the organ systems. Surface anatomy should remain in the foundations block and can be tied to physical exam skills also taught in this block. Students have also requested more time allowed for surface anatomy. We currently have shared sessions where half the students participate in surface anatomy while the other half perform dissection and then the two groups switch halfway through. I propose creating a schedule that continues this model for surface anatomy and dissection but transitions the majority of the labs

to prosection-based learning. If possible, dissection should follow prosection-based instruction so students have already had the opportunity to see and study the structures they are tasked with dissecting.

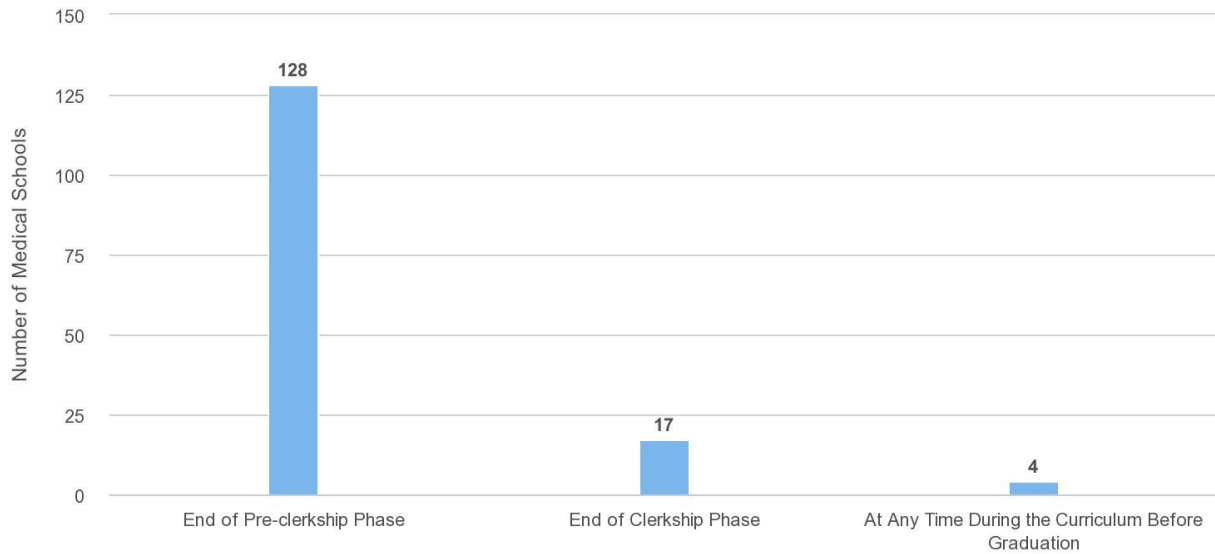
In addition to anatomy instruction in the pre-clerkship period, I advocate for finding ways to incorporate anatomy into the clerkship and post-clerkship phases. These might include revisiting anatomy as part of the intersessions or creating elective rotations for graduating students to perform dissections.

- Amanda Phares, MD

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Appendix 10 – Schools that have deferred USMLE Step 1

Time in the Curriculum in Which Medical Schools Require Students to Take the United States Medical Licensing Examinations (USMLE):
USMLE Step 1



Click a legend item below to add or remove a column from the report.

■ 2017-2018
N = 147

INTERNAL