The new HMS Pathways curriculum is grounded in the latest evidence and best practices in learning and teaching about medicine, critical thinking, compassionate care, and professional development. Student-centered and relationship-centered approaches are at the heart of the curriculum: this means that meaningful collaboration and ongoing communication between faculty and students are essential in building a vibrant learning community. Our faculty’s model of care for and communication with our learners will set the model for approaches to care for patients and their families: this includes a deep commitment to lifelong learning, mutual respect and compassion, tolerance for uncertainty, openness to taking risks and asking questions, and ongoing curiosity about the clinical, biomedical, and psychosocial dimensions of medicine. This is the first of a series of Guides designed to provide suggestions and resources to help faculty and students create an environment that provides optimal conditions for learning.

Why a new curriculum?

Pathways is a response to advances in the cognitive and learning sciences, to the availability of new technologies to enhance learning, and to the recognition that bringing students into the patient care environment earlier in their training will make learning more immediately relevant, meaningful, and exciting. Earlier clinical exposure can evoke more sophisticated questions among learners and provide a deeper awareness and appreciation of the key role of biomedical, population, social, and behavioral sciences for providing the best care for patients.

For a more detailed overview of the new curriculum, see: https://hms.harvard.edu/departments/medical-education/md-programs/pathways.
What are some of the key learning principles of Pathways?

We want to set the stage for students to be active, lifelong learners who know how to assess their learning needs, seek feedback, and continually grow professionally and personally throughout their medical careers. We start with some key, evidence-based principles:

1. **Active learning**: Retention of knowledge and ability to apply knowledge to different and more complex problems are best achieved through active forms of learning (in contrast to listening to a lecture, for example). Working on novel problems, collaborating with others, and engaging with the material in a variety of ways will help you store new knowledge in long-term memory and enable you to more easily engage in higher-order thinking (such as analysis, synthesis, evaluation, making new connections, new insights).

2. **Building on prior learning**. Also known as **constructivism**, cognitive scientists have shown that knowledge and understanding are not simply acquired but are constructed by the learner. How? By building on existing knowledge, engaging in actively learning material, reflecting on learning, and creating mental maps of the new material. When you actively link your current learning to your prior knowledge—and to what you are learning in other courses—you will begin to consolidate and integrate this material into a deeper understanding of the principles of medicine.

3. **Interleaving**. Interleaved practice, sometimes called “mixed practice,” involves learning and practicing several related skills or concepts at a time rather than focusing on one topic or skill at a time and then moving on to the next one (i.e., “block practice”). Harder in the short term—e.g., in practice tests learners who study in block mode tend to score higher—in the long term, test scores and skill levels are considerably higher for learners who mix up their learning.

    The curriculum is set up for interleaved practice within and across your courses.

4. **Creating a learning community**. Some of the most powerful learning comes not from individual study but from learning in a community with shared knowledge, values, and engagement. Fostering positive, collaborative learning relationships with peers, faculty, and staff and patients in the clinic will provide you with insights into different ways to approach problems, appreciation of the value of diverse experiences and perspectives, and a deeper understanding of what it means to be in the profession of medicine or dentistry and part of inter-professional healthcare teams.

5. **Motivation from within**. While external motivation such as course or national exams may serve as strong drivers for studying, internal motivation such as curiosity, a passion for learning, and desire to provide the best patient care possible will drive long-term retention, self-directed learning, and life-long commitment to learn and grow as a professional.

    In sum, to maximize learning: **Prepare, reflect, discuss, struggle with concepts, hypothesize, compare and contrast, apply in different contexts, test yourself. Repeat.**
Here are some essential expectations and suggestions for students:

**Come prepared.** The most effective way for you and your colleagues to acquire and retain information and to be able to think critically is for you to prepare ahead of time, so you can discuss the material and learn and remember it. To support your own learning, and to be accountable to your peers, please be sure to complete the assigned readings, videos, and quizzes before class.

**Engage!** You will learn and remember more and your evaluations will be stronger if you fully engage in the learning process by joining in discussions in your small group and, whenever possible, in the larger group as well.

We understand that some people are completely comfortable talking in a large group, others are more comfortable in smaller groups; some people think on their feet and others may need more time to reflect before sharing an opinion or comment. We encourage you to participate in the large group discussions but do not require it. If you are not yet comfortable speaking in the larger group, we encourage you to set this as a goal for your own professional development and to help you develop your ability to think on your feet.

**Be willing to share uncertainty and questions.** Some of the best and most enduring learning comes from struggling with an issue. We try to create questions and exercises that will challenge you and help you come to a deeper understanding of course content and enable you to apply your learning to new situations and contexts. While you may be tempted to participate only when you know the “right answer,” we want everyone to become comfortable taking risks and to “think out loud” so we can help each other achieve a deep level of learning.

**Work the problem(s)!** Research shows that “effortful practice”—that is, expending cognitive effort to retrieve knowledge and to apply it (rather than just looking up answers)—will strengthen your memory, problem-solving abilities, and cognitive flexibility. These will be essential as you progress in your learning and will help you to more easily draw on your growing fund of knowledge and be able to address new problems with greater efficiency and creativity.

**Share the floor with your colleagues.** If you find yourself dominating a conversation, please take a step back and remember that everyone in your group should have a chance to participate. If you find yourself sitting back a bit too much, push yourself to step in to the conversation more fully. The best doctors are not only skilled at explaining, presenting, or articulating a point of view; they are equally skilled at listening and being present to others.

**Reflect on your learning, study habits, and thinking processes.** With the considerable challenges of learning and integrating new material, it is often easy to forge ahead without stopping to reflect on what is working, what is not working, and what kind of feedback might be helpful to you. Frequently stepping back to engage in metacognition (“thinking about thinking”) and reflection on your learning and approaches to problem-solving can give you insight into how to cultivate the most effective habits of mind to maximize your learning.
What will a typical class look like?

In general, most courses will follow the structure of a Case-Based Collaborative Learning Session (article on this by HMS investigators will be published soon in *Academic Medicine*). A typical class might go like this: The class will be divided into four groups, sorted by society. Each group will have at least two faculty members. You will most likely have readings and/or activities (such as a quiz) prior to each class session, and it will be very important that you complete these prior to class. When you arrive at class, **first**, faculty will probably check in with you about how you are doing with the latest lecture, readings, and assignments. They will make note of your questions, concerns, and comments, and try to address them at some point during the day's class. Those they cannot address will be up on at a later time or sometime outside of class in one-on-one or small group meetings. **Next**, you will work in small groups to discuss the case or problem set. Everyone in the small group should contribute, and faculty will be walking around to check in on how the discussions are going and offer help if needed. **Then**, the class will regroup and debrief about their small group discussions in the large group. The class may move between small working groups and large discussion groups several times over the course of one class session. Both learners and faculty will share ongoing, regular feedback about what when well, what might be changed, and how well student behaviors and interactions contributed to the learning environment.

### Recommended resources

1. **Make it stick: The science of successful learning** *(2014)*
   
   Cognitive scientists Henry Roediger, PhD and Mark McDaniel, PhD describe how many commonly used study habits are counterproductive, and offer “concrete techniques for becoming more successful learners.” See their website for lots of good summaries and links to talks by the authors: [http://makeitstick.net/news.php](http://makeitstick.net/news.php).

2. **Drive: The Surprising Truth About What Motivates Us** *(2011)*
   
   Daniel Pink summarizes decades of research that describe what motivates us individually and as members of organizations. His website will also bring you to links for talks, podcasts, and additional resources: [http://www.danpink.com/](http://www.danpink.com/).

3. Coursera.org online course: **Learning how to learn: Powerful mental tools to help you master tough subjects**. University of California San Diego. [https://www.coursera.org/learn/learning-how-to-learn/home/info](https://www.coursera.org/learn/learning-how-to-learn/home/info) Taught by Barbara Oaks, PhD, professor of engineering, and Terrence Sejnowski, a pioneer in computational neuroscience. Dr. Oaks studies the complex relationship between neuroscience and social behavior, and Dr. Sejnowski’s research seeks to understand the principles that link brain to behavior. This course describes effective, scientifically validated approaches to maximize efficiency and effectiveness in study habits and learning. There are 4 hours of video, 3 hours of exercises, and 3 hours of additional material—all can be completed at your own pace.