Get Ahead
“I felt that there was a very smooth and very intuitive transition from learning about a topic to soon afterwards applying that.”

Shervin Rezaei
HMX Student
Learn foundational topics in medicine with Harvard Medical School.

Designed to take full advantage of the online medium, HMX integrates fundamental principles and clinical applications.

Harvard Medical School offers HMX courses to our incoming students over the summer as an opportunity to prepare for a demanding curriculum and to our current students as part of the flipped classroom model.
Courses benefit individuals interested in a career in health care.

Lessons introduce concepts in ways that combine best practices from learning sciences and biomedical visualization.

Real patient interactions demonstrate the clinical relevance of the material and how doctors use fundamental principles in practice.

Rich analytics capture students’ interactions and learning gains, points of confusion, and completion statistics.

Courses are crafted by leading HMS faculty members working with a skilled team of educators and creative production experts.
HMX Fundamentals courses feature:

**True-to-life Scenarios** that give students a contextual framework for exploring concepts, providing relevance and integration of key principles through storytelling.

**Dynamic Animations** that combine illustrative visuals with narration to guide learners through complex processes in a step-by-step, self-paced way.

**Concept Videos** that take advantage of faculty’s expertise to explain key concepts in digestible segments, using writing, drawing, and animations along with conversational tone.

**Clinical Application Videos** that take learners inside the hospital or other clinical setting with outstanding HMS clinicians or inside the research labs of world-class scientists. Designed to demonstrate the clinical relevance and significance of the foundational topics learners are studying, these videos provide applications of knowledge and a glimpse into students’ potential futures.

**Interactives** that guide learners through a topic by encouraging active engagement and experimentation with simulations and other uniquely responsive visuals.

**Notetaking Guides** that are visually crafted to support and encourage reflective synthesis and review of key topics.

**Question and Answer Forums** that foster exploration of questions and peer-to-peer interaction and learning.

**Interleaved Assessments** that provide feedback, enhance learning, and allow students to self-evaluate and measure their progress.

Dynamic visualizations that reveal...
Courses in the HMX Fundamentals series focus on key foundational concepts in Physiology, Immunology, Genetics, and Biochemistry, taking traditionally difficult-to-learn concepts and applying the latest educational research and digital technologies to enhance the student experience. Topics include:

**Genetics**
- Introduction to the Human Genome
- Central Dogma and Genetic Variation
- Mendelian Inheritance of Disease
- Identifying Mendelian Disease Genes
- Chromosomal Aberrations
- The Genetics of Cancer
- Common Complex Traits
- Human Population Genetics
- Beyond the Genome Sequence
- Genetics and Precision Medicine

**Immunology**
- Overview of Immunology and the Immune System
- Innate Immunity and Inflammation
- Microbial Recognition and Responses in Innate Immunity
- Antibodies - Structure and Function
- Lymphocyte Development and Diversity
- T Cell Activation by Antigens
- T Cell-Dependent B Cell Responses
- Helper T Cells
- Cytotoxic T Cells
- Failures of the Immune System
- Novel Immune Therapies

Storytelling that teaches

Visuals that guide
"It very clearly laid out how all of these concepts translate into medicine in real life and helping patients and working with people."

— Lauren Kratky
HMX Student

Biochemistry
- Introduction to Biochemistry
- The Rules of Energy
- How Energy is Harnessed
- How Energy is Transformed
- How Cells Compartmentalize
- How Cells Specialize
- How Cells Communicate
- The Chemistry of Life

Physiology
- Partial Pressure
- Movement of Body Fluids
- Flow Through Tubes
- Compliance
- Supply and Demand
- Transmural Pressure
- Dynamic and Steady State Conditions
- Acid–Base
- Homeostasis
- Exercise – Integration

Metaphors that illustrate

Clinical applications that bring relevance
“I felt like the explanations were really stellar...I was thinking that as an online course it was going to be a light fly-through of the material, but they really went in-depth in a way that I didn’t expect.”

— Khalil Ragland
HMX Student

“I feel that my experience with the courses that I took has given me a beneficial head start to my path in pursuing medicine and the foundation I need to succeed in the future.”

— Kathryn Brewster
HMX Student
“Doing it before medical school helped because learning concepts helps make difficult subjects intuitive. You can start to construct a model in your head instead of having to work it out each time.”

— Rebecca Hammond
HMX Student

“...when we were learning about the production of nucleic acids and the example of the patient with gout, it really made me feel like I want to learn this so I can treat patients like that in the future.”

— Kitaе Park
HMX Student
Demonstrated Learning Gains

Data from pilot courses to-date indicates that students are highly engaged and learning from this unique approach, demonstrating how principles from learning science can be combined with user feedback and course metrics to improve the effectiveness of online educational materials.

Quizzes at the beginning and end of the Immunology course demonstrated large and statistically significant learning gains for students at all levels of background knowledge.

83 percent increase in immunology knowledge
“I liked the quizzes after every lesson, because it made sure that you correctly understood what was being taught.”

— Briah Barksdale
HMX Student

Brought to you by the Office of Online Learning within HMS External Education, HMX brings to bear the vast medical knowledge, clinical expertise, and academic excellence of Harvard Medical School while taking full advantage of the online medium to teach foundational concepts in medicine in new ways and to reach learners around the world.

World-class HMS faculty bring medical concepts to life by integrating clinical experiences, bedside teaching, and real doctor-patient interactions within the research and clinical facilities of Harvard Medical School. Real-world scenarios bring medical concepts beyond the institution, making them relevant for every learner.

Our online programming is engaging and rigorous, bringing forth all of the educational innovation and excellence you’ve come to expect from Harvard Medical School.
“It is exciting to see these fantastic new approaches to medical education being used successfully both here at HMS and by innovative schools around the world.”

Edward Hundert, MD
Dean for Medical Education
Harvard Medical School

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