In Friend of OCW's March 2015 newsletter

View this email in your browser

MITOPENCOURSEWARE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

AMO Physics on OCW

Wolfgang Ketterle lecturing in 8.421.

He's Seen Colder

Imagine you are an undergraduate studying physics, and you dream of doing research making fundamental discoveries about matter and energy. But you have no way of penetrating the mystery of how this research takes places, or what exactly is needed to get to this level of understanding.

You don't, that is, until now.

OCW has just published two MIT graduate-level courses providing a full academic year's worth of study in AMO (Atomic, Molecular, and Optical) physics: *8.421 Atomic and Optical Physics I* and *8.422 Atomic and Optical Physics II.*

Both courses have full video lectures, extensive reading lists, and assignments.

Thank You for Your Support!

Friend of OCW your support makes it possible for us to continue to create a foundation for a whole new generation of online learning opportunities.

We hope you'll help us spread the word about OCW by telling your friends and family to visit our site and we welcome you to connect with us further on our social media sites.

We encourage you to learn more about our corporate sponsorship program and other ways to contribute to OCW.

Thank you again!

The courses are taught by Professor Wolfgang Ketterle, who, along with other MIT researchers and researchers from Harvard University, is a member of the group known as the Center for Ultracold Atoms.

As Professor Ketterle explains in his introductory lectures, students who take these courses "will be able to talk about atoms and light as experts at the most profound level."

AMO physics is a fascinating field. Long ago (i.e., in the 1950s and 1960s), research focused on individual particles, especially two-particle collisions. The field was thought to have played itself out, reaching the limits of what was discoverable. But advances in technology and bold new ideas opened the field to undreamed-of possibilities in the decades following.

More powerful lasers, with extremely short pulses (down to the attosecond—one quintillionth of a second) have enabled researchers to control single photons and to cool atoms until their temperature registers in terms of the picokelvin (one trillionth of a Kelvin).

Researchers first explored "few body" physics, entanglement, and quantum information science, then advanced to "many body" physics, quantum gases, and ultracold states, barely above absolute zero.

Breakthrough after breakthrough has arisen, where no one had predicted. As a result, a number of Nobel prizes have been awarded in AMO physics—in 1997, 2001, 2005, 2012—for very recent discoveries, in contrast to the usual gap of decades between discovery and award.

Although he does not mention it in his introductory lectures, Professor Ketterle was one of the Nobel recipients in 2001 for demonstrating the ultracold form of matter known as the Bose-Einstein Condensate, in

which atoms condense into a single quantum state.

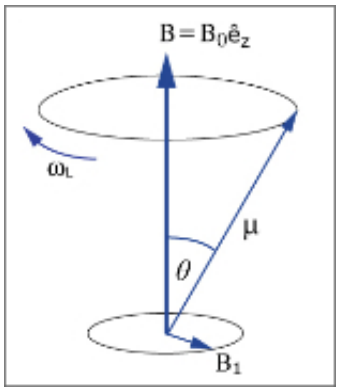
On his This Course at MIT page, Professor Ketterle discusses how he uses clicker questions, how he's been thinking about web-based problem sets, why he uses a tablet computer instead of a blackboard when lecturing, and more.

So think of it—the opportunity to learn from a leading researcher of cutting-edge science for an entire academic year, at your leisure and pace—all for free on OCW.

Who would have predicted that?

New Courses

4.609 The Art Museum: History, Theory, Controversy

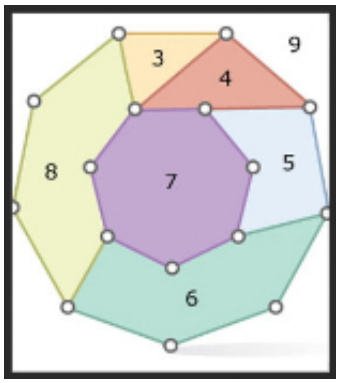


8.421 Atomic and Optical Physics I

- CMS.611J Creating Video Games

Updated Courses

21F.730 Hispanic America: One Hundred Years of Literature and Film



18.314 Combinatorial Analysis

- 2.080J Structural Mechanics

> Find courses that interest you
> Subscribe to the RSS

OCW Educator

Image courtesy of Taylor Perron. Used with permission.

Rocking It In Class and Out—Way Out

Introductory geology can be among the most enjoyable educational experiences for students if only because there is so much hands-on activity in the

labs, with all the rock samples and minerals to identify and analyze, and of course, there are field trips!

Students get to leave campus for the great outdoors and go on hikes to look at landscapes, geologic features, outcrops, rocks, and the life forms that have adapted to live in these places. They see the world as they have never seen it before. What could be more fun?

OCW has just published an updated version of *12.001 Introduction to Geology*. The course is co-taught by Professors Taylor Perron and Oliver Jagoutz, and the OCW site has abundant and detailed lecture notes, colorful lecture slides, and an extensive set of labs and lab exercises.

A highlight of the course is a field trip to eastern New York and western Massachusetts. The field trip is really many trips rolled into one, with 11 stops over a weekend spent camping. Included on the OCW site is a thorough field trip guide, which has an itinerary for each stop (with directions and a schedule), explanations of what is being observed, geologic maps and illustrations, and exercises. The trip exposes students to "geologic evidence for the past action of plate tectonics" as students examine "various rocks from different tectonic settings that have been used to reconstruct the complex Paleozoic history of the eastern United States and Canada." This is so much more than leaf peeping!

On their This Course at MIT page, the instructors explain the importance of providing students with a narrative context for the trip, in other words "a good story," so students can appreciate what they are experiencing. The instructors share other key insights, such as the advantages of co-teaching (developing a "repartee" by playing off of one another in class adds to the excitement), the relevance of geology to human society, and the importance of getting students

comfortable with “messiness.”

>See more This Course at MIT pages

Highlights for High School

Photo of "Elvis at Mary's Party." Image by Mark Surman.

Pop Quiz!
What activity uses the terms Elvis leg, anchor, and crash pad?
A. Gymnastics
B. Rock climbing
C. Ballroom dancing
D. Wrestling

Click here for the answer!

MITx News

Shaping the Next Generation's World of Work

Even after the Great Recession, the American economy continues to be the wonder of the world—nimble and efficient in a tumultuous environment. Innovative products and services crop up every day, implementing exciting new ideas and new technologies. The stock market is booming. Inflation, once an untamable menace, has vanished.

Yet somehow this picture of bountiful productivity has left many high and dry, and for younger people the American Dream seems elusive. Even those who study hard and act responsibly have trouble finding decent paying jobs. Many are hobbled with massive student debt. Their future, rather than being bright, seems in jeopardy. How can this be? Is this just the way capitalism works in the 21st century?

MIT Sloan Professor Tom Kochan provides the keys to understanding these issues in his new MITx on edX course, 15.662x The American Dream for the Next Generation. The course starts on March 23 and runs for nine weeks. Professor Kochan brings to the discussion the knowledge he has accumulated from decades studying employment patterns and labor-management relations.

You can familiarize yourself with some of his work by visiting the courses he has published on OCW:

15.668 People and Organizations, *15.676 Work, Employment, and industrial Relations Theory*, *15.343 Managing Transformations in Work, Organizations, and Society*.

The situation is dire, Professor Kochan admits, but he insists that it is decidedly fixable.

“I don’t believe that it’s some invisible hand of the market that’s created the challenges we’re facing,” he says in the introductory video to 15.662x. “Instead, it’s policies and attitudes, and actions or inactions that have created these problems. But I also believe that we can make a difference.”

That difference can arise from cooperation between employees, managers, educators, and government officials, and also from individuals making decisions about their own futures. Professor Kochan will take the students of 15.662x on a personal journey, helping them define the American Dream for themselves, and building a career plan to carry them forward.

Why not join them and see if you can find a way to a brighter future?

>Explore other upcoming MITx on edX courses

Views From Our Supporters

"I wanted to thank you for all the help you personally, and somewhat paradoxically without any personal interaction, have been to my fundamental

understanding of Chemistry and also to the new found interest for it.

The lectures that are present for viewing on youtube, as part of the MIT OpenCourseware program, have had a profound impact on me, and I'm sure, other students on a global scale.

If I ever had trouble grasping a concept, or putting the subject at hand in any meaningful context; your lectures, your anecdotes, your way of teaching has been a remedy to such concerns. Never have I had the pleasure to listen and learn from a person with such passion.

Thank you for Everything."

- Hugo, University Student, Sweden

> Read more

Tell us what you think of OCW here.