Fall 2005

18.325 — *Topics in Applied Mathematics:*
Mathematical Methods in Nanophotonics

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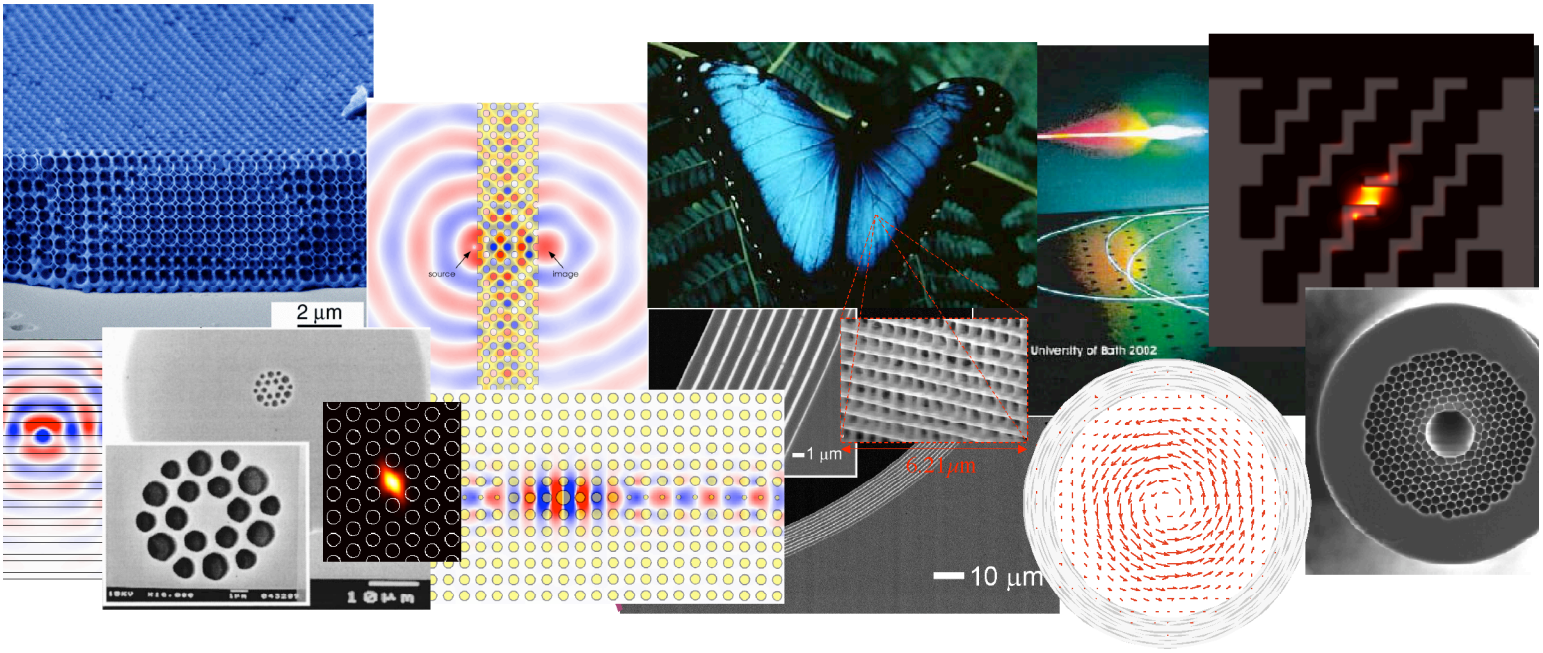

Tired of doing electromagnetism like it's 1865?

Find out what solid-state physics has brought to 8.02 in the last 20 years, in this new course surveying the physics and mathematics of nanophotonics — electromagnetic waves in **media structured on the scale of the wavelength**.

In this regime, which is the basis for everything from iridescent butterfly wings to distributed-feedback lasers and integrated optical devices to the next generation of optical fibers, the 140-year-old analytical techniques you learned in 8.02 aren't very useful. Instead, we will cover computational methods combined with high-level algebraic techniques borrowed from solid-state quantum mechanics: linear algebra and eigensystems, group theory, Bloch's theorem and conservation laws, perturbation methods, and coupled-mode theories, to understand surprising optical phenomena such as those pictured above.

For advanced undergraduates and beginning graduate students.
Prerequisites: 18.03, 8.02, some experience with partial differential equations helpful.