

# Syllabus

By Cyril Manning

## PMB 104: Discovery-Based Research in Microbiology

Not all laboratory classes are created equal—even a professor will tell you that. Take Kathleen Ryan, assistant professor of microbial biology: “All my lab courses as an undergraduate were terrible,” she says. “They made lab work something that was scary instead of exciting.”

That’s why Ryan designed PMB 104, an intensive summer course that gives students the opportunity to make new scientific discoveries of their own.

“Faculty would love to take on more undergraduate lab assistants,” says Ryan. “But unfortunately most undergrads have had very little experience. This course gives students the skills to join a lab and contribute work that’s really valuable.”

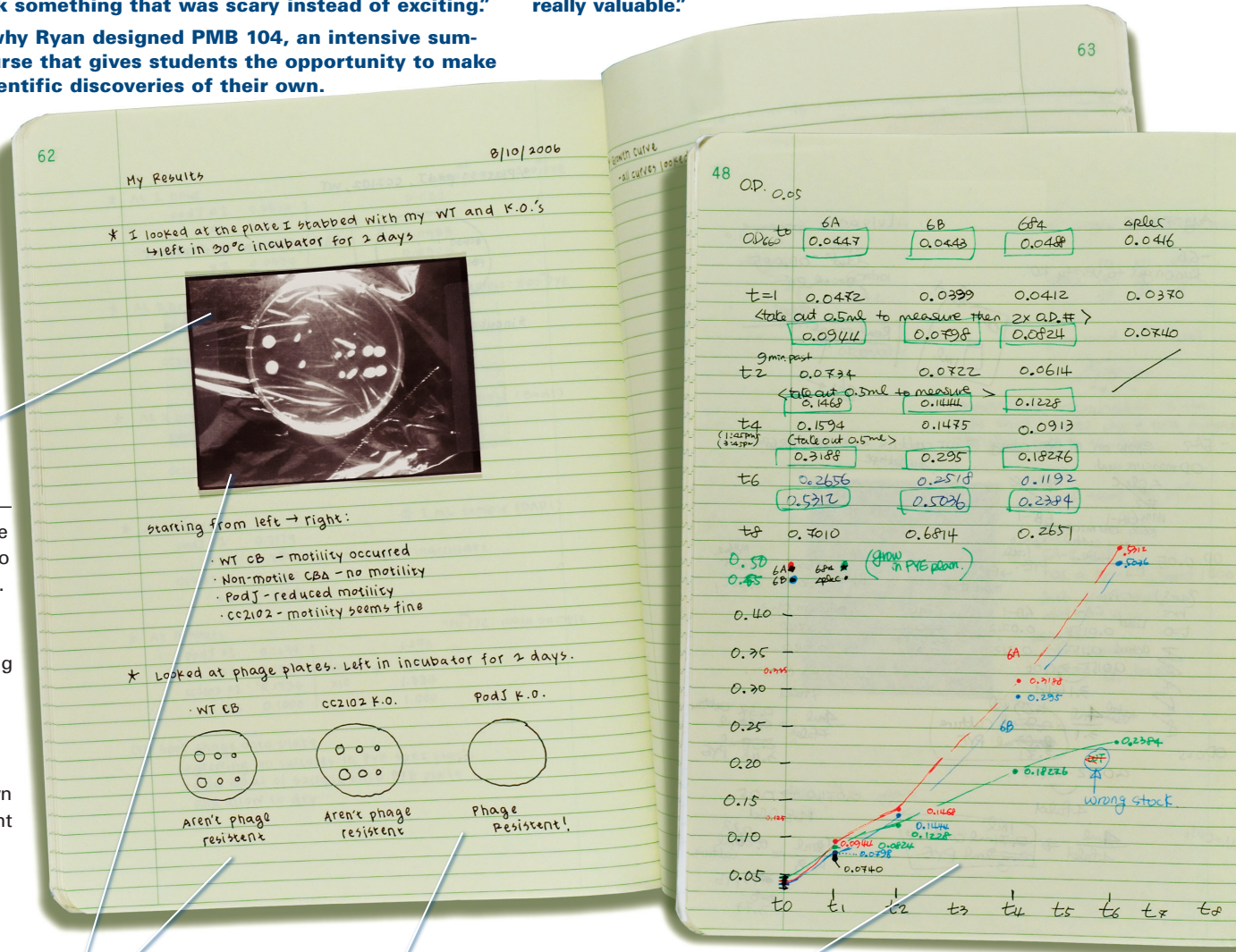
Ryan’s lab studies *Caulobacter*, a bacterium with a unique cell division process. She assigned each student to knock out two separate *Caulobacter* genes—that is, to turn those genes off in order to study what they do. With one gene that had been studied, correctly determining its function meant the student was getting the process right. But the other gene was of unknown function; the student was creating new knowledge.

Senior Donna Lee created cultures of wild type (WT) and knockout (KO) *Caulobacter* and incubated them for two days. Here, she records their motility.

Lee then exposed the mutants to a virus (or phage) and found that one of them was phage resistant.

Here, senior Michelle Meador plots the optical density of her own mutant and wild type bacteria in order to track the different strains’ growth. She saw her wild type culture, represented by the green line, growing much too slowly. She had used the wrong culture medium, and an antibiotic was killing the cells.

That kind of mistake couldn’t make Ryan happier. “In some lab classes you have just one chance to do something, and if you screw it up you just have to move on,” says Ryan. “But in real research you screw up all the time, and you have to keep going back to it until you get it right.”



Genevieve Shiffar