



## Robert Banik, M.S.

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### WebAssign® Helps Guide Calculus Students to Mastery, Step-by-Step

Robert Banik has taught a range of mathematics courses at Mississippi State University during his seven years there. For the two years that he's taught calculus to about 350 students per semester, he has used WebAssign®, selected by his department to support calculus and higher-level mathematics courses. Used for homework, this proven online solution enhances problems from Robert's textbook with video solutions, interactive tutorials, and immediate feedback.

#### THE CHALLENGE — PROVIDING ONE-ON-ONE GUIDANCE

Many students who enter Robert's calculus course either don't know much about trigonometry or don't remember what they learned in previous courses. They also need more one-on-one instruction than Robert can provide in class or in office hours. In particular, students need help building problem-solving skills, a fundamental learning objective in calculus. "If students didn't have the ability to use WebAssign's *Master It* tutorials or *Watch It* videos outside of class, they'd be lined up around my office," he says.

Robert is thankful for the automatic grading of calculus homework that WebAssign provides. "If students weren't doing homework online in WebAssign, I would assign problems out of the textbook," he says. "But I wouldn't be able to count homework as part of the grade because it would be too tough to go through 350 assignments in a timely manner. Students wouldn't find out how they were doing in class until they took a test, and that wouldn't give them much time to catch up."

#### THE RESULTS — HAPPIER STUDENTS, MORE PRODUCTIVE CLASSES

Homework assignments in WebAssign are based on problems pulled directly from Robert's text. He can choose from thousands of problems and several problem types, and assign algorithmic versions if he wishes. Students get immediate feedback and can link to a variety of resources to get extra help. *Watch It* videos provide narrated, step-by-step video solutions to problems using different values than those assigned. Robert can also post WebAssign's section-level video lectures, which cover major concepts. "Students tell me they enjoy the problems that come with videos, and they also like that the videos and eBook [included with WebAssign] are linked," he says.

Robert uses the eBook in class, too. "I like having the eBook on hand to help address specific issues. It's easy to pull up examples. I can walk students through problems that confused them. I also like the *Tools for Enriching Calculus*, which include animations that allow students to visualize concepts."

#### CHALLENGES

- Promoting development of problem-solving skills is a key goal in calculus, but students need abundant practice and guidance outside of class to build proficiency.
- Many calculus students need remediation in precalculus skills, but instructors often can't allocate class time to help them.
- Instructors with large classes don't have time to assist all students who need help. Students often have questions as they do homework after office hours, but instructors often can't respond quickly by email.

#### SOLUTIONS

- WebAssign®
- Stewart, James, *Single Variable Calculus: Early Transcendentals*, 7th Edition

#### RESULTS

- WebAssign® provides virtually unlimited practice opportunities and guidance that walks students step-by-step through the problem-solving process. *Master It* tutorials guide students through the solution to a similar problem and provide feedback along the way, helping to promote concept mastery.
- *QuickPrep* modules review key precalculus topics, helping students brush up on needed skills. *Just in Time* questions allow students to remediate trigonometry and other topics in the context of the calculus being taught.
- Students receive help outside of class through online homework problems enhanced with worked examples, problem-specific video solutions, and tutorials. Auto-grading saves instructors time. Immediate feedback on incorrect answers encourages students to continue practicing. Students come to class better prepared and ask more focused questions, making class time more productive.

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WebAssign assists Robert in his efforts to help students become better problem solvers. *Master It* mini-tutorials guide students through the solution to a similar problem and provide feedback along the way. “The *Master It* problems walk students step-by-step through a problem, so students get a good sense of how it is solved.” As students do their homework, they can get enhanced feedback for incorrect solutions, gaining insight into common errors. Students can also receive hints on how to approach selected problems.

WebAssign’s auto-grading and gradebook features ease Robert’s workload. “The gradebook takes care of just about everything throughout the semester; I even post grades there. It definitely cuts down on the emails and visits I would get otherwise.”

### SELF-REMIEDIATION WITH QUICKPREP AND PERSONAL STUDY PLANS

Students needing to brush up on trigonometry get support from WebAssign’s *QuickPrep* modules, which review key precalculus topics. *Just in Time* problems allow students to remediate their trigonometry in the context of the calculus being taught. “It’s easy to assign a set of trig problems to help students refresh their skills,” says Robert.

WebAssign also gives Robert the option of activating a *Personal Study Plan* feature, which provides assessments that show students what material they know and what areas require more work. For items answered incorrectly, students can link to related study resources. “The Personal Study Plans allow students to do extra problems in addition to the homework — it’s another resource that I can offer to them.”

Although Robert has no pre-WebAssign class performance statistics to use as a benchmark to gauge the solution’s effectiveness, he’s not concerned. “I can’t imagine WebAssign not helping student outcomes. I enjoy using WebAssign. It’s a very good product and it does everything I

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