1098-90-283 **Uday V. Shanbhag*** (udaybag@psu.edu), 310 Leonhard Building, University Park, PA 16803, and **Hao Jiang**. *Stochastic approximation schemes for stochastic optimization problems with imperfect information.*

We consider the solution of a stochastic convex optimization problem $\mathbb{E}[f(x;\theta^*,\xi)]$ over a closed and convex set X in a regime where θ^* is unavailable. Instead, θ^* may be obtained through the solution of a learning problem that requires minimizing $\mathbb{E}[g(\theta;\eta)]$ in θ over a closed and convex set Θ. Traditional approaches have been inherently sequential and practical implementations may often be corrupted by error. To resolve this challenge, we present a coupled stochastic approximation scheme which simultaneously solves *both* the computational and the learning problems. The schemes are shown to be equipped with almost sure convergence properties in regimes when the function f is either strongly convex as well as merely convex. Importantly, the scheme displays the optimal rate for strongly convex problems while in merely convex regimes, through an averaging approach, we quantify the degradation associated with learning by noting that the error in function value is $\mathcal{O}\left(\sqrt{\frac{\ln(K)}{K}}\right)$, rather than $\mathcal{O}\left(\sqrt{\frac{1}{K}}\right)$ when θ^* is available. Preliminary numerics demonstrate the performance of the prescribed schemes. (Received January 28, 2014)