962-92-966 **Zhilan Feng*** (zfeng@math.purdueedu), Department of Mathematics, Purdue University, West Lafayette, IN 47907, and **Horst R Thieme** (h.thieme@asu.edu), Department of Mathematics, Arizona State University, Tempe, AZ 85287. *Endemic models for the spread of infectious diseases with arbitrarily distributed disease stages.*

We develop a model for the spread of an infectious disease that allows for arbitrarily many stages of infection all of which have general length distributions and disease mortalities. Existence and uniqueness of solutions to the model equations are established. A basic reproduction ratio is derived and related to the existence of an endemic equilibrium, to the stability of the equilibria, and to weak and strong endemicity (persistence) of the disease. We use a time scale argument to find explicit formulas for the inter-epidemic. It turns out that the familiar formula for the length of the interepidemic period of childhood diseases has to be reinterpreted when the exponential length distribution of the infectious period is replaced by a general distribution. Using scarlet fever in England and Wales, 1897-1978, as an example, we illustrate how different assumptions for the length distributions of the exposed and infectious periods lead to quite different values for the minimum length of the quarantine period to destabilize the endemic equilibrium. (Received September 29, 2000)