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## Modelling Epidemics Using the Toolkit of Chemical Kinetics

Extracurricular workshops were offered to undergraduate students at the University of Birmingham on modelling the spread of infectious diseases. The MATLAB-based exercise exploring the classic S-I-R epidemic model drew upon and extended the students' knowledge of chemical kinetics. Rate equations of the Consecutive Reactions Scheme and the changes in the concentrations of the reactant, intermediate and product were examined as a starting point for exploring the changes in the numbers of susceptibles, infected and recovered within a population. Positive feedback present in the growth of the number of infected –identified as the key difference between the two mechanisms –was also discussed as the phenomena called autocatalysis seen in some chemical reactions. During the workshop, the students explored the effect of the reproductive number and the recovery rate, and how reducing the former through means like social distancing resulted in 'flattening the curve'. The solution guide given out after the sessions contained the answers to all questions on the worksheet and an additional model script for fitting the S-I-R equations directly to observed data.

### Key words

epidemic modelling, reaction kinetics, transferrable skills

### Region

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