



Upcoming Meetings

Title: -

Presenter: -

Abstract: -

SMP Pandemic Seminar Group

Regular Time: Mondays 8PM (AEST)

Zoom ID: [866342450](#)

Further details:

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Past Meetings

June 29

Title: On COVID-19 household transmission studies

Presenter: James Walker

Abstract: Household transmission studies, known as First Few X (FFX) studies, are currently being conducted in Australia. These involve surveilling known cases and members of their households for symptoms, as well as regularly testing individuals in the households. We hope that these highly detailed data on multiple household outbreaks will allow us to infer important behaviour of COVID-19 such as the relative infectiousness and susceptibility of children, the proportion of infected individuals that become symptomatic and the contribution of pre-symptomatic infectiousness.

In this presentation I will discuss stochastic models for COVID-19 outbreaks in households and discuss methods that we are using to infer parameters of these models based on FFX data.

Recording: -

June 15

Title: Agent-based simulators for the study of COVID-19 spread

Presenter: [Ramprasad Saptharishi](#)

Abstract: The talk will provide an overview of epidemiological agent-based models. Specifically, we will discuss why agent-based models are useful, the components of agent-based models, and the various issues related to their validation. We will then turn to COVID-19 and will survey a few agent-based models in use (that we are aware of). Subsequently, we will discuss the IISc-TIFR city-scale agent-based framework for comparing various "unlockdown" strategies. The talk will end with a discussion of the outcomes of our studies on Mumbai and Bengaluru, e.g., graded openings of offices, graded opening of train services in Mumbai, importance of compliance, and the impact of different containment strategies.

Ramprasad will also be joined by his colleague Sandeep Juneja and Rajesh Sundaresan from the Indian Institute of Science. Whilst we know that many of you are already familiar with their [City-Scale Epidemic Simulator](#), the following may also be of interest:

- [COVID-19 Epidemic: Unlocking the Lockdown in India](#)
- [COVID-19 Epidemic Study II: Phased Emergence From the Lockdown in Mumbai](#)
- [Modeling of epidemic spread in Indian urban conditions](#)

Recording: <https://www.youtube.com/watch?v=oD-NT6DCeMc>

June 8

Title: Social media analysis and COVID-19

Presenter: [Lewis Mitchell](#)

Abstract: The COVID-19 pandemic has produced a number of areas where mathematical modelling and data science might make important contributions to the public health response. Concurrently, it has led to an unique improvement in the number of datasets (some anonymised, some not) being provided by typically-ungenerous tech companies to researchers to potentially assist with this response. This talk will explore how we are utilising a few of these datasets coming from the large social media platforms to attack COVID-related problems, including:

- Measuring social distancing and predicting risk using Facebook data
- Quantifying the ‘arc’ of patient experience of COVID-19 using Reddit
- Contact tracing: tracking public sentiment towards the COVIDSafe app using Twitter, and modelling app effectiveness

A third topic, dealing with Reddit data that Lewis didn’t speak about, can be found in his preprint: <https://arxiv.org/pdf/2005.10454.pdf>

Recording: <https://www.youtube.com/watch?v=CoDvLZdXvQ4>

May 25

Title: What the data tells us and does not tell us about the COVID-19 pandemic.

Presenter: [Richard Kollar](#) from Comenius University, Bratislava

Abstract: Spreading of SARS-CoV-2 infection brings a lot of intriguing questions: How is the virus spreading, what are the clinical details of the COVID-19 disease, etc. From the point of mathematical modeling and data analysis the main questions are how many people are infected and what information is hidden in the available data. First, we demonstrate that the data across almost all countries shows universal scaling despite the fact that the enforced measures, level of infection and testing procedures vary. We will also discuss some recent findings about the testing and data limitations and propose a model that can capture the main features of the pandemics and at the same time can be validated by the available data.

A fresh preprint by Katka Bodova and Richard Kollar is the following: [Emerging Polynomial Growth Trends in COVID-19 Pandemic Data and Their Reconciliation with Compartment Based Models.](#)

Recording: <https://www.youtube.com/watch?v=TUsSvjy7gc4>

May 18

Title: Contact network topology and epidemic control.

Presenter: [Michael Small](#)

Abstract: Emerging infectious diseases are characterised by extremely limited knowledge of the key epidemic parameters. In the early stages of an outbreak this can make modelling difficult. I will present a network modelling approach where the characterisation of spread focusses on control strategies. In essence, one can view different control strategies as effecting changes in the contact network topology. This will allow us to make general observations on the effectiveness of “social” distancing (which I would prefer to call “physical” distancing), limitations of gatherings, quarantine, isolation and travel restrictions. Viewed through the lens of complex systems, these various social restrictions manifest as scale-free networks, random graphs, or small-world lattices. We will obtain some simple analytic results and conduct agent-based simulations for the Australian experience. Our simulations show good agreement across states and also provide room to interpret the effectiveness of our control efforts to date. Finally, these techniques will allow us to make estimates of the remaining infectious but asymptomatic population as we move from containment to elimination. For WA, as of May 4, we estimate 5-15 infected individuals remaining in the community.

The [obligatory preprint in which a mathematician rediscovers epidemiology is here](#) and our implementation of the calculations underlying this are on [GitHub here](#).

Recording: <https://www.youtube.com/watch?v=xMAOIhG8EEY>

May 11

Title: The mathematics and physics of virions.

Presenter: [Ross McKenzie](#)

Abstract: Virus epidemics involve fascinating phenomena at multiple scales, from the biochemical to the social. I will introduce some of the beautiful mathematics and condensed matter physics associated with the structure, properties, and function of single virus nanoparticles (virions), such as SARS-CoV2. This understanding may aid the development of a vaccine and anti-viral drugs. Topics covered present opportunities for public outreach, undergraduate teaching, and research.

Topics include icosahedral symmetry, Penrose tilings, Euler characteristic, RNA, Landau theory of phase transitions, spherical harmonics, self assembly, coarse graining, and entropic forces.

For some of the flavour of the seminar watch the first few minutes of [this short animation](#) and look at these papers

- [Geometry as a Weapon in the Fight Against Viruses](#), Rieden Twarock
- [On Virus Growth and Form](#)
[Roya Zandi, Bogdan Dragnea, Alex Traveset, Rudolf Podgornik](#)

Relevant material is also available at my [blog](#)

Recording: <https://www.youtube.com/watch?v=IFF6KsRDP4A>

May 4

Title: Safe Blues: A Method for Estimation and Control in the Fight Against COVID-19.

Presenter: [Yoni Nazarathy](#)

Abstract: How do fine modifications to social distancing measures really affect COVID-19 spread? At the moment, we don't know! In an imaginary world, we would develop a harmless biological virus that spreads just like COVID-19 but is traceable via cheap and reliable diagnosis. Then by spreading such an imaginary virus throughout the population, the spread of COVID-19 could be estimated because the benign virus would respond to population behaviour and social distancing measures in a similar manner to COVID-19. However, such a benign biological virus does not exist. Instead, we developed a safe and privacy-preserving digital alternative. We call this framework Safe Blues. More information is on <https://safeblues.org/>.

This is joint work with Raj Dadekar (MIT), Shane Henerson (Cornell), Marijn Jansen (UQ), Sarat Moka (UQ), Chris Rackauckas (MIT), Peter Taylor (Melbourne), and Aapeli Vuorinen (a free man on route to Columbia University for his PhD).

Recording: <https://www.youtube.com/watch?v=zgDVv8x03U4>

April 27

Title: Minimising lockdown periods for regional elimination of covid-19.

Presenter: David Kault

Abstract: Several countries, perhaps including Australia, may be successful in eliminating covid-19. However, there has been a negative sentiment regarding elimination because it may be thought that asymptomatic cases will lead to re-emergence of the epidemic when "lockdown" ends. However, there is evidence that so called super-spreaders are important in covid epidemiology. In this talk, branching processes will be explained and

used to show that elimination is likely to be considerably easier than might have been expected.

Recording: <https://www.youtube.com/watch?v=vy6VUts61AU>

April 20

Title: The "Australian modelling".

Presenter: [Cecilia González Tokman](#)

Abstract: Cecilia will lead our discussion on the "Australian modelling", as per this paper: https://www.doherty.edu.au/uploads/content_doc/McVernon_Modelling_COVID-19_07Apr1_with_appendix.pdf which was recently released at: <https://www.doherty.edu.au/news-events/news/covid-19-modelling-papers>

Recording: N/A

April 13

Title: "The Modelling and the Data" an amateur look at the pandemic of COVID-19.

Presenter: [Taras Plakhotnik](#)

Abstract: There are two sides in the developing story of COVID-19 — the models and the actual data. I will present a brief digest of what I have learned from reading papers and meditation, a physicist view.

Recording: <https://www.youtube.com/watch?v=4wtWlwulsEA>

April 6

Title: Mathematical modelling of the covid epidemic.

Presenter: [Zoltan Neufeld](#)

Abstract: In this talk first I will introduce the general properties of the simple SIR epidemic model and discuss an extension applied for predicting effectiveness of control strategies for the covid pandemic.

Recording: <https://www.youtube.com/watch?v=uG3ipWMzn5Q>

March 30

Title: N/A (Seminar 1)

Presenter: [Sally Shrapnel](#)

Abstract: For those who don't know her, Sally is a medical doctor, physicist, and machine-learner. She is now leading an urgent analysis effort associated with Covid

patient data from ICUs (Intensive Care Units). In this first seminar, expect to get up to date on general clinical and epidemiological information from Sally.

Recording: on request

