



# Full Syllabus



**Course Title** Computational Models in Cognition

**Lecturer** Marius Usher

**Semester** I

**Course requirements:** i) cognitive psychology, including memory, visual attention.  
ii) Some computational background (basic maths, or programming, Matlab, etc).

**Final grade components:** course work (805) + 3 exercises (20%). Article presentation (5 bonus points; voluntary contribution)

## Course schedule

Class no. / Date	Subject and Requirements (assignments, reading materials, tasks, etc.)
1	<b>Introduction to modeling:</b> rationale, domains and examples. Neurons and networks. Firing-rates and spikes. Integrate-and-fire model. The neural code; Cell assemblies, the Hebbian-framework. <b>Practical-1:</b> Introduction to Matlab; Using Matlab to plotting RT-distributions and calculate accuracy in experimental tasks.
2	<b>Connectionism (PDP framework);</b> Localistic vs distributed representations; Learning and in neural networks. Perceptron and Back-Propagation; Semantic knowledge; Generalisation
3	From Signal-detection to sequential sampling models <b>Practical-2:</b> Introduction to model simulations, Race and Diffusion
4	<b>Models of choice-RT(2):</b> race and diffusion models (optimality).
5	<b>Models of choice-RT (3):</b> Leaky-Competing-Accumulators. Independent vs Competition models <b>Practical3 – LCA model</b>
6	<b>Models of choice-RT-4:</b> Temporal-weighting of evidence (LCA vs Diffusion)
7	<b>Modeling value based decisions</b> (risk, choice biases, and attentional selection) <b>Practical4 :</b> Fitting accuracy and RT with the diffusion model
8	<b>Modeling decision between food items based on eye-movements (Attention Drift Diffusion);</b>
9	<b>Models of Attention-1:</b> salience, pop-out and Visual Search; Figure-ground. <b>Practical-5:</b> Value based decision and selective integration model



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10	<b>Models of Attentional-2.</b> Cueing, Stroop, the flanker test; attentional control, task-conflict.
11	<b>Models of Memory:</b> Activation memory; the activation buffer, modeling dissociation between STM/LTM. <b>Practical-6: The Stroop model</b>
12	<b>Modelling decision confidence, sequential control.</b>

**Required course reading**

Research articles that will be uploaded on the moodle website

**Optional course reading**

**Comments**