Learning and Memory – From Brain to Behaviour

Monsoon 2024, 4 credits

Mon/Thurs, 2pm – 3:25pm, H205

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**Course Overview**

This course is designed for students to learn the core concepts of learning and memory mechanisms in the brain. The course will go in-depth and discuss important scientific experiments and theories, and neural models that have helped to shape the understanding of learning and memory behaviour. The content is a mix of cognition, neuroscience, and neural network models.

**Course Topics :**

Introductory Module

* Psychology of Learning and Memory
* Neuroscience of Learning and Memory

Learning Module

* Habituation, Sensitization, and Familiarization: Learning About Repeated Events
* Classical Conditioning: Learning to Predict Significant Events
* Operant Conditioning: Learning the Outcome of Behaviors
* Generalization, Discrimination Learning, and Concept Formation

Memory Module

* Episodic Memory and Semantic Memory
* Skill Memory
* Complementary learning systems in the brain /Memory network in the brain
* Working Memory and Cognitive Control

Integrative Module

* Emotional/Stress Influences on Learning and Memory
* Social Learning and Memory: Observing, Interacting, and Reenacting
* Development and Aging: Learning and Memory Across the Lifespan

**Preferred Text Books :** Learning and Memory- From Brain to Behavior (3rd edition, 2020) - Mark A. Gluck, Eduardo Mercado, Catherine E. Myers, Worth Publishers (Macmillan, New York)

**Reference E-book Link:** <https://www.macmillanlearning.com/college/ca/product/Learning-and-Memory/p/1319107389>

**Grading Plan:**

**No Quiz1 or Quiz2 – only surprise class quizzes.**

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| **Type of Evaluation** | **Weightage (in %)** |
| Surprise In-class quizzes | **35%** |
| Mid Sem-Exam | **25%** |
| End Sem Presentations in Class  (group of 4 students design novel experiments)  Contributions made by every student in the group will be evaluated individually | **30%** |
| Participation in-class discussions (those who think and make interesting observations and ask relevant/critical questions in class) | **5%** |
| Participation in experiments | **5%** |

**NO NEGOTIATION OF GRADES AT THE END OF THE SEMESTER.**

**Grade distribution**

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| **Grade** | **%** |
| A | >= 88 |
| A- | 81-87.5 |
| B | 74-80.5 |
| B- | 66 -73.5 |
| C | 59-65.5 |
| C- | 52-58.5 |
| D | 40 – 51.5 |
| F | Below 40 |

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| Class No. | Date | Topic |
| 1 | 1st August | Intro |
| 2 | 5th August | Brain and Neurons |
| 3 | 8th Aug | Repetition Behaviour (habituation, sensitization, priming, etc.) |
| 4 | 12th Aug | Predicting events (classical conditioning) |
| 5 | 16th Aug | **Thursday schedule on Friday**  Prediction event contd. |
| 6 | 19th Aug | Predicting reward – operant conditioning |
| 7 | 22nd Aug | Predicting reward contd |
| 8 | 26th Aug | Generalization (**QUIZ 1**) |
| 9 | 29th Aug | Generalization contd |
| 10 | 2nd Sept | Working memory |
| 11 | 5th Sept | Cognitive Control, Brain-training, cognitive training, Near- and far-transfer, Neuroplasticity, inference |
| 12 | 9th Sept | Practice effects, motor skill, transfer of training, habits |
| 13 | 12th Sept | Recollection recognition familiarity, Memory Search, signal detection theory |
|  | 16th Sept | **HOLIDAY** |
| 14 | 19th Sept | updating, consolidation, reconsolidation, Forgetting, amnesia |
|  | 23rd Sept | **Mid-term** |
| 15 | 26th Sept | Episodic and semantic memories |
| 16 | 30th Sept | Social Learning – mirror neurons, Observing and Reenacting, perception influences on memory |
| 17 | 3rd Oct | Factors affecting memory (fear, emotions, stress, ptsd, exercise, etc.) |
| 18 | 7th Oct | Memory extra |
| 19 | 10th Oct | Memory during development |
| 20 | 14th Oct | Memory across lifespan, inter-generational, autobiographical memory |
| 21 | 17th Oct | Extra Class **QUIZ 2** |
| 22 | 21st Oct | Presentation in-class |
| 23 | 24th Oct | Presentation in-class |
| 24 | 28th Oct | Presentation in-class |
|  | 31st Oct | **NO CLASS - DIWALI** |
|  | 4th Nov | **NO CLASS – Saturday schedule** |
| 25 | 7th Nov | Presentation in-class |
| 26 | 11th Nov | Presentation in-class |
| 27 | 14th Nov | Presentation in-class |
| 28 | 18th Nov | Presentation in-class – LAST CLASS/ES |
|  | 21st Nov | Presentation in-class |
|  | 24th Nov | Presentation in-class |