**Course No:** CS-AI-???

**Course Title:** Computational emotional thinking

**Credits:** (4-2-2)[[1]](#footnote-0)

**Instructor:** Max Talanov (email: [max.talanov@gmail.com](mailto:max.talanov@gmail.com))

**Prerequisite courses:** None

**Course outline**

This course provides insight in cutting edge AI domain that is currently under heavy development. It is based mainly on works of Marvin Minsky from AI domain, psychological works of Robert Plutchik from evolutional psychology domain, neuroscientific works of Lovheim.

Starting point of the course is industry task of Help desk automation, thus we indicate the need and use of computational emotions even in industrial background. Then we take bird eye view on the thinking via Marvin Minsky approach of six thinking levels, determining the AI philosophical framework for further discussion. Later discussion takes in account psychological models of emotions with main emphasis on Plutchik “Wheel of emotions”. From the neuroscientific perspective we review basis of neural activities taking in account the main neuromodulators of human emotions. This gradually delivers us to the Lovheim “Cube of emotions” 3D model based on monamines activities that we map later to computational processes of current computers. Then we review the current state of computational spiking neural networks and cognitive architectures [Artificial cognitive Systems course] that could be bases for implementation of computational emotions.

**Required background knowledge:**

None.

**Course Syllabus:**

* Artificial and natural intelligence and orchestra of emotions in several practical examples.
* Emotional thinking from bird eye view.
  + Consciousness.
  + Levels of mental activities.
  + Thinking.
* How it works from psychological perspective: psychological models of emotion.
* Neuroscientific background:
  + Neurons and chemical synapses
  + Neurotransmission
  + Role of neuromodulators and Lovheim “Cube of emotions”
* Artificial emotions.
  + Cognitive systems
  + Spiking NNs: HTM, NEST

**Textbook:**

**Reference Materials:**

* Minsky, M. (2007). The emotion machine: Commonsense thinking, artificial intelligence, and the future of the human mind. Simon & Schuster.
* Picard, R. W. (1995). Affective computing (Tech. Rep.). M.I.T Media Laboratory PerceptualComputing Section.
* Cambria, E., & Hussain, A. (2012). Sentic computing. techniques, tools, and applications. Springer.
* Marc-Oliver Gewaltig and Abigail Morrison and Hans Ekkehard Plesser. NEST by example: an introduction to the neural simulation tool NEST.
* HIERARCHICAL TEMPORAL MEMORY including HTM Cortical Learning Algorithms. Numenta Inc. 2011.

**Course Delivery:** The course will be given, one day per week from September to November 2014. There will be two 2-hour classes each day. There is one assignment. Tutorial exercises will be set periodically. There is a final examination only. Course project is currently under consideration.

**Computer Resources:** No computer resources are required for this course.

**Laboratory Exercises:** There are no laboratory exercises for this course.

**Laboratory Resources:** There are no laboratory resources required for this course.

**Assessment:** Assignment (80%), and Final Exam (20%).

1. (Credit-hours – Laboratory hours per week – Lecture hours per week) [↑](#footnote-ref-0)