Expected learning outcomes

- Describe and apply concepts, methods, and theories of search, heuristics, games, knowledge representation, and planning
  - Describe admissible and consistent heuristics
  - Apply min-max and alpha-beta search
  - Knowledge of methods for cutting of search (Quiescence search, Forward pruning, Beam search)
  - Apply inference methods of First-Order Logic, e.g. Forward and Backward Chaining, resolution.

- Describe and apply concepts, methods, and theories of logic and probability theory and to analyze the power and limitation of their use for knowledge representation and reasoning systems
  - Approaches for capturing Knowledge Domain, e.g. symbolic representations using First Order Logic, Description Logics, probabilistic representations using joint probability distributions, Bayesian Networks, HMM, MDP.
Expected learning outcomes (2)

• Describe methods and theories of Bayesian networks, probabilistic reasoning over time and Hidden Markov Models, MDP, decision trees, and learning
  - DT: Know the definition of Shannon and binary entropy
  - DT: Construct a decision tree using entropies
  - RL: Difference between active and passive RL
  - RL/MDP: Definition of the Bellman EQ (ch. 17.2 & 21.3)
  - BN: Pearl’s Network Construction Algorithm
  - BN: Know how to define different queries in a BN
  - HMM: Know how to identify observable and unobservable variables from an application domain.
  - HMM: Construct a HMM using Markov assumptions.
  - HMM: Know the different inferences which a HMM can support.
  - MDP (new for this year): know the different components of a MDP.
  - MDP (new for this year): know the use of Bellman equation for solving MDP.
Expected learning outcomes (3)

- Describe and apply methods and theories for hybrid architectures, odometry, motion planning, topological and metric route planning, and localization and map generation
  - Know the difference (e.g. strengths and weaknesses) between deliberative, reactive, and hybrid architectures
  - Difference between natural and artificial landmarks
  - Difference between topological and metric path planning
  - Explain sensor model and evidential methods (Bayesian/HIMM)

- Multi-Agent Systems (new for this year)
  - Describe what MAS is and what it is expected to do better than ordinary intelligent systems
  - Define MAS from the four categories: autonomy, proactivity, reactivity, social capabilities
  - Define the BDI model.
  - Explain the four dimensions from Murphy: Heterogeneity, control, cooperation, goals