PROGRAM: *MSc and PhD in Computer Science*
MODULE: Automated Planning
CODE: *54600-02* **CREDITS:** *02* **TOTAL HOURS:** *30 hours*
VALID: *From 20013/II*

OBJECTIVES: A student who completes this course should be able to:

1. Understand the main formalisms used for automated planning and the assumptions behind these formalisms.
2. Understand modern algorithms to solve automated planning problems and basic optimization techniques that can be applied to these algorithms.
3. Apply automated planning systems to solve real-world problems

PLAN:

Automated planning: formalisms and assumptions. Classical planning: formalisms and algorithms. HTN Planning: formalism and algorithms. Non-deterministic planning: formalisms and algorithms. Applications of automated planning.

UNIT: 01
CONTENT: Introduction and context

1.1. Search algorithms
1.2. Heuristics
1.3. Complexity of search algorithms
1.4. Classical planning

UNIT: 02
CONTENT: HTN Planning

2.1 Hierarchical task network formalism
2.2 Problem formalization
2.3 SHOP Algorithm

UNIT: 03
CONTENT: Stochastic Planning

3.1 Decision Theory
3.2 Markov Decision Processes (MDP)
3.3 MDP solvers

Campus Central
Av. Ipiranga, 6681 – Prédio 32 - CEP: 90619-900
Fone: (51) 3320-3611 – Fax (51) 3320–3621
E-mail: ppgcc@inf.pucrs.br
www.pucrs.br/facin

3.4 Reinforcement Learning

UNIT: 04
CONTENT: Applications of automated planning

4.1 Problem modeling
4.2 Planning in agent programming languages
4.3 Planning in multiagent Systems

REFERENCES

- **TEXTBOOK(S)**

1. GHALLAB, Malik; NAU, Dana and TRAVERSO, Paolo. Automated Planning: Theory and Practice. San Francisco: Morgan Kaufmann, 2004. 635 p.

- **REFERENCE BOOK(S)**

2. RUSSELL, S. J.; NORVIG, P. Artificial Intelligence – a Modern Approach. 3ed. New Jersey: Prentice Hall, 2003. 932p.

- **OTHER REFERENCES**

3. Selected papers
4. Websites related to the course
5. https://github.com/pucrs-automated-planning

- ***SOFTWARE***

6. PDDL4J http://pddl4j.sf.net
7. JSHOP2 http://www.cs.umd.edu/projects/shop/
8. JavaGP http://emplan.sourceforge.net

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