SUBJECT PROGRAM

I   IDENTIFICATION OF THE SUBJECT

Subject: **Algorithms and Complexity**		Acronym: **INF-221**	Approval date 10/11/2016 (CC.DD. Agreement 13/2016)		
UTFSM Credits : **3**	Prerequisites: **INF 152 and INF 253**	Exam: **Does not have**	Faculty **Computer Science Department**		
SCT Credits : **5**					
Weekly Lecture Hours : **3**	Weekly Assistantship Hours: **1.5**	Weekly Laboratory Hours: **0**	Semester in which it is taught		
			Odd	Pair **X**	Both
Formative axis: **Engineering Sciences - Computer science for complex problems in industry**					
Total time dedicated to the subject: **140 chronological hours**					

Subject Description

The student applies theoretical foundations to identify levels of complexity of an algorithmic problem. Designs algorithms, according to the different strategies that allow the solution of problems in computing. Select the most appropriate strategy (brute force, greedy algorithms, divide and conquer, *back-tracking, branch and bound*, dynamic programming, among others) for the design of an algorithm, evaluating its performance.

Entry requirements

- Apply basic counting techniques.
- Apply data structures.
- Apply graph theory to model.
- Programming using recursion.
- Demonstrates the correctness of programs.

Contribution to the graduation profile

Specific Competence

- Apply theoretical and algorithmic foundations to develop efficient ways to solve computational problems.

Transversal Competencies

- Act with autonomy, flexibility, initiative, and critical thinking when facing professional problems.
- Develop their work with solid criteria that allow you to ensure quality from a systemic perspective.

Learning outcomes expected to be achieved in this subject.

- **Design** algorithms to solve problems, **applying** appropriate solution strategies.
- **Evaluates** algorithmic strategies, **considering** the area of application.
- **Analyzes** the complexity of algorithms, **considering** alternative solutions.
- **Analyze** simple situations, **applying** basic concepts of algorithmic complexity theory.

Thematic contents

- Simple numerical algorithms.
- Lower bounds of problems: ordering and search.
- Algorithm design strategies: brute force, greedy algorithms, divide and conquer, *backtracking, branch and bound*, dynamic programming, among others.
- Pattern recognition algorithms in strings/text.
- Algorithmic Complexity Theory.

Teaching and learning methodology

- Expository method.
- Problem-based learning (PBL).
- Resolution of exercises in assistantships and tasks.
- Cooperative/collaborative learning.

Evaluation and grading of the subject (Adjusted to Institutional Regulations-Regulation No. 1)

Approval requirements and qualification	The evaluation and qualification process consists of: It is evaluated through 2 tests (C1 and C2), tasks and participation in assistantships.

Evaluation instrument	%
Competition (C1)	30
Competition (C2)	35
Average Tasks (PT)	30
Assistantship Average (PA)	5

Learning Resources

Virtual platform

Bibliography:

Guide Text	• Cormen, Thomas H., Leiserson, Charles E. (2009). Rivest, Ronald L., Stein, Clifford. "Introduction to Algorithms" (3rd edition). MIT Press.
Complementary or Optional	• Rawlins, Gregory J.E. (1992). "Compared to What?: Introduction to the Analysis of Algorithms". WH Freeman & Co. • Sedgewick, Robert, Flajolet, Phillipe 2013 "An Introduction to the Analysis of Algorithms", (2nd edition), Addison-Wesley Professional. • Steven Skiena. (2010). "The Algorithm Design Manual" (2nd Ed.). Springer Science+Business Media.

II. CALCULATION OF NUMBER OF HOURS OF DEDICATION - (SCT-Chile) - SUBJECT SUMMARY TABLE.

ACTIVITY	Number of hours of dedication		
	Number of hours per week	**Number of weeks**	**Total number of hours**
PRESENCE			
Lecture or theoretical classes	3	17	51
Assistantship/Exercises	1.5	fifteen	22.5
Industrial visits (from Field)			
Laboratories / Workshop			
Evaluations (exams, others)	2	2	4
Others (specify)			
NO PRESENCE			
Assistantship			
Mandatory tasks	4	7	28
Personal Study (Individual or group)	2	17	3. 4
Preparation of reports and Problem resolution			
TOTAL (HOURS)			140
Total number of TRANSFERABLE CREDITS			5