Bachelor Thesis Proposal Form

Student's Name:

Double Major and Minor (if student has one):

Referent Instructor's Name: Giovanni Conforti

Department/Lab: CMAP

Internship tutor's Name:

Bachelor Thesis Preliminary Title: An approximation algorithm for the MAXCUT problem

We consider an <u>unoriented</u> graph $G=(V,E)$ where V is the set of <u>vertices</u> and E the set of edges. The <u>MAXCUT</u> problem is the problem of finding the subset of <u>vertices</u> $W\subseteq V$ with the maximum number of outgoing edge, i.e. with the maximum number of edges having one end in W and one end in $V\setminus W$. This problem, although very simple to state, it is computationally very hard to solve. Indeed, the <u>MAXCUT</u> problem is NP-complete. Quite surprisingly, there exists an \emph{approximation algorithm}, due to <u>Goemans</u> and Williamson, that runs in \emph{polynomial time} and has a very good guaranteed performance. The expected value of the solution produced by this algorithm is at least 87% of the optimal value! The goal of this thesis is to learn the basics of the theory of approximation algorithms and how this clever algorithm works and implement in Python. If time allows, the question of how to adapt this algorithm to solve other <u>combinatorial</u> optimization problems can be considered.

Project's Relevance (150 words max)

Outline how this research project is linked with your double major or minor (if applicable). Explain how this project will help expand your knowledge in at least one of these areas. Be as specific as possible.

Method of Evaluation *(To be completed by the Referent Instructor)*

A grade will be given ranging from 1 to 20 to the student report. This grade will be decided by the referent instructor together with the Tutor and the researcher who proposed the thesis subject. Such grade is based on

-The clarity and coherence of the written report

-The scientific quality of the report and in particular on how much progress has been made by the student with respect to the thesis objectives

-The accuracy and correct implementation of the codes

A grade will be given ranging from 1 to 20 to the oral defense that reflects

-The clarity of exposition and presentation of the result

-The quality of the answers given by the student to the questions posed by the examinators.

The final grade is the result of 0.6*(report grade)+0.4*(defense grade)

Student's Name:	Referent Instructor's Name:Giovanni Conforti

Date:	Date:
Student's Signature:	Referent instructor's Signature: