

INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI
PROFORMA FOR NEW COURSE

1.	Title of the Course	Algorithmic Engineering
2.	Course Number	CS5022
3.	Status of the Course	Elective
4.	Structure of Credits	3-0-0-3
5.	Offered To	PG
6.	New Course/Modification to	New
7.	To be Offered by	Dr. G. Ramakrishna
8.	To take effect from	January 2019
9.	Prerequisite	CoT
10.	Whether approved by the Department	Yes
11.	Course Objective: To bridge the gap between theory and practice in algorithms, by analyzing and implementing efficient libraries.	
12.	Course Content: The phases of algorithmic engineering life cycle such as design and analysis, implementation, experimentation and profiling, along with various machine models will be discussed, with the help of case studies. Algorithmic Tuning: propagation, preprocessing, memoization, filtering, pruning. Code Tuning: loop unrolling, data-access patterns, temporal locality, spatial locality. Route planning algorithms and speedup techniques: Bidirectional search, ALT, Hub-labeling, Transit-node routing, arc-flags, contraction hierarchy, customizable contraction hierarchy, phast, multi-criteria shortest path. Journey planning in public transportation: connection-scan-algorithm, raptor algorithm, guide-book routing, transfer patterns, scalable transfer patterns, multi-modal journey, ride sharing, multi trip vehicle routing. Machine models: RAM, cache aware, cache oblivious, external memory, parallel computing.	
13.	Text book(s): 1. Matthias Müller-Hannemann, Stefan Schirra, <i>Algorithm Engineering: Bridging the Gap Between Algorithm Theory and Practice</i> , Springer, (2010).	
14.	Reference(s): 1. Catherine C. McGeoch, <i>A Guide to Experimental Algorithmics</i> , Cambridge, (2012).	