A Memo to Undergraduate Thesis Students

1. Introduction. CSE 400 or Thesis is the most exciting and an exceptional course in your undergraduate studies. This course is distinguishable in many ways from other courses. For example, it has highest credit (of 6) assigned to any course, its work load spans for more than a year, it does not have any final exam, no class test, no fixed syllabus, and may be no fixed contact time. After hectic and tiresome 3-years of studies, thesis is a "dissertation" at the end of your undergraduate studies. It is also the most important course in your undergraduate studies. Through this course you will accomplish yourself in many ways for your forthcoming future, irrespective of your choice of higher studies, business or job.

You will learn many things simultaneously in this single course. Among them, the most important thing is that you will learn how to deal with big, unknown and unexplored problems and challenges. As the problem is unexplored, you will take this challenge, and most probably you will be the first one who solves this challenging problem. In other undergraduate courses, up to Level 3 Term 2, the largest problem/project that you work with is a term assignment, like a 4-bit computer design. But thesis is at least five times more than that.

The next important thing that you will learn is how to work in a group and under the supervision of your supervisor. Such a group consists of at least two persons–-you and your supervisor. But in most cases in consists of one or two more of your classmates. In any case, the students will do their thesis work under the guidance of the supervisor. Among other things, you will also learn how to present your thesis work by writings, presentations, publications, etc.

2. A Successful Thesis. Generally a successful thesis means two things: (1) a good amount and a good quality of work, and (2) a good grade. There are many things that you should be careful of to make your thesis successful. It is well-experienced that the very first criterion for a successful thesis is a good combination of "student", "thesis topic", "supervisor" and "hard work". When you give your choice for thesis and then have been assigned a thesis and a supervisor, part of this criterion has been fulfilled, that means, a teacher has offered a topic that he/she likes and you have got a topic, partners and a supervisor that almost match your preferences. The rest of this criterion is to make a good understanding and working environment among the students and the supervisor which can be fulfilled by your hard work. A thesis being done by some very talented students on a very challenging problem and supervised by a very renowned professor may not lead to a successful thesis, unless the combination is good enough.

A supervisor will use his/her effort to motivate a student to work towards his/her thesis topic, and a student will follow his/her responsibilities on thesis works and responsibilities to his/her supervisor. There is no fixed list of responsibilities, but a student should use his/her own maturity, judgment and ethics to find them. This can not be compared with the responsibilities in other courses or with other thesis groups. It may happen that the topic, partners and the supervisor that you have been assigned are different than what you expected. For example, the topic may turn not to be interesting, the supervisor may be too good for you, your partners are non-cooperating and not equally active, etc. Similar feelings may happen to a supervisor too. Although primarily it is the supervisor who will try to adjust this type of circumstances and make it comfortable for students, most importantly it is the responsibility of a student to work hard as per the demand and guidance of the supervisor.

3. Who is Your Supervisor? Probably the most important person in your undergraduate academic life is your thesis supervisor. The term "supervisor" itself is not enough to explain the meaning of a supervisor. He/she is at the same time your co-worker, co-researcher, project partner, mentor, academic parent, and (not surprisingly) friend. He is the most powerful person in your academic career. A good and successful thesis can not be done without the active guidance of the supervisor. After getting supervision for your thesis for the entire thesis period, you shall need your supervisor in the rest of your life. When you go for higher studies or a good job, it is the supervisor whose even a single-line recommendation can make a big difference for you. In many personal matters too, a supervisor plays an important role and a reliable lead.

After graduation, when you go for higher studies or job (in abroad), you will get similar supervisor, who will be the most important person there. In that unknown environment, he/she can make your life easy, or can make it difficult if it goes bad. Having supervisor in your undergraduate thesis is kind of a training to adapt yourself to more challenging environment and for more important part of you career.

3. Publications from Thesis. On the way of a successful thesis, good results should come out of the thesis work. Recognition for those good results is definitely a good grade. However, there are some other recognitions also, such as publishing the results in good conference proceedings and journals, presenting them in seminars, conferences and workshops, participating with them in national and international competitions, etc. If some of these recognitions can be achieved, then they will help you getting good jobs and good admissions for higher studies. Both a supervisor and students will share the joy of their hard work and achievement of such recognition. Usually students should be enthusiastic and excited for achieving such recognition, while a supervisor is more careful, experienced and determined not to miss it. Many good theses miss such recognition due to following reason: the conference/journal/competition was not chosen carefully or was not chosen with the proper consent of the supervisor, or everything was done in a hurry. It is the supervisor who

plays the correct role in these matters. At the beginning of a thesis, a supervisor has more "hold" on the thesis topic, but gradually the student will learn the ins and outs of the topic and will enrich his/her knowledge even more than the supervisor. However, this does not in any way mean that such recognition can be achieved by the sole initiative of the students. Utilizing the experience of a supervisor is very crucial for this.

Quite frequently, it happens that a student likes to work in conjunction with his friends and/or other teachers on topics/projects other than his/her own thesis-topic. Moreover, some good results and consequently some good recognition may come out of those works. It has been experienced that sometimes students feel shy or hesitant to inform this thing to his supervisor. But remember that, once a student is involved in other works/projects, he/she is spending time that was supposed to spend in his/her own thesis. So, consequently, a student will miss what his/her supervisor has asked him/her to do for the thesis.

On the other hand, sometimes a student may be too good such that he/she can perform well in both his/her thesis work and non-thesis works/projects. That is fine. But again remember that, your supervisor is your academic parent. So, it is wise to inform him about what you are doing beside your thesis work. Once you fulfill your obligation to your thesis work, your supervisor will definitely encourage you to do those works beside your thesis.

4. Some Other Ethical Issues You Should Know Regarding Your Thesis.

- Copyright. The ownership of a thesis done at BUET solely belongs to BUET. It is BUET's own intellectual property. So, using this property in future by anyone, even by the students who have done the thesis, has some restrictions and requires permission from BUET.
- References. A student will require recommendation letters and contact details from his/her supervisor and other teachers. A supervisor as well as other teachers always feel proud to recommend their beloved students for their bright future in higher studies and jobs. However, it is a courtesy and a way of honor to ask for the consent of a teacher before his/her name can be used as a reference and give him enough time for writing a recommendation letter for you.
- Plagiarism. A student should be very careful in copying results from other thesis or somewhere else. By doing this you are cheating yourself, your supervisor, your academy and the world. Although at the beginning, a supervisor may not notice that a student is involved in such activities, in the long run he/she can easily understand and catch-up those things, which may put the student into a terrific situation. By its tradition, BUET is very harsh to punish any kind of plagiarism.
- Fairness to Thesis Partners. Naturally, not every members of a thesis group are equally talented and active. But this should be accepted generously by all the members. Everybody should dedicate his/her best effort for the thesis and should not take a chance that other members will do the job. A more talented and active member should encourage others to work hard, and at the same time he/she should not pretend himself in front of the supervisor as a superior member. It should be like a team work with equal effort.

5. Summary and Checklist.

In summary, we encourage the student to take into account the following points very carefully:

1. Thesis is the most important and most weighted course, so take it seriously.
2. A successful thesis means good work, good grade, and good recognition, such as good publications. So put your best effort to achieve all of those.
3. Be open, cooperative, communicative and respectful to your supervisor and follow his/her guidance. You will find your supervisor as you expected.
4. Keep your supervisor updated on your thesis and non-thesis works all the time.
5. Do not go for any publications without the consent of your supervisor.
6. Take consent of your supervisor before using and asking his reference and using his name in any publications.
7. Be generous to your thesis partners, do not keep yourself away from thesis work or do not pretend yourself better than others, work like a team.
8. Keep a safe distance from any type of plagiarism.
9. Thesis is a BUET property. So, follow copyright rules for using it in future.
10. This document may not cover all unwanted issues that may arise during your thesis. In any such cases, consult with your supervisor openly and with due respect.

Finally, we wish you a very good and successful thesis.

Department of Computer Science and Engineering, Bangladesh University of Engineering and Technology

Thesis Topics for L-4/T-1

Sl No	Topic	Description	Students no
Dr. M. Kaykobad			
1	Topic-1		
2	Topic-2		
3	Topic-3		
Dr. Muhammad Masroor Ali			
1	Web Service Testing		2/3
2	Web Service Testing		2/3
Dr. Md. Abul Kashem Mia			
1	Algorithms for the Prediction of Protein Folding		2 or 3
2	Algorithms for the Multiple Longest Common Subsequence Problem		2 or 3
3	Algorithms for Retrieval of Protein Tertiary Structure		2 or 3
Dr. Md. Saidur Rahman			
1	Graph Drawing, Graph Algorithms, Bioinformatics, VLSI Layout Algorithms, Software Restructuring, Social Network Analysis	. Exact topics will be fixed after discussing with students based on their interest and aptitude after assignment of students to me. For theoretical problems two students may form a group. To get idea about research area visit http://teacher.buet.ac.bd/saidurrahman/index.htm http://www.buet.ac.bd/cse/research/group/gd/	Maximum 9 students
2	Design of a Surveillance system of Dhaka City	Implementation based thesis.	Max 3, Min 2
Dr. Md. Monirul Islam			
1	Devising computational intelligence techniques for solving bio-informatics problems		
2	Devising population based algorithms for finding good solutions of complex optimization problems		
3	Use of computational intelligence techniques for data mining.		

Dr. Md. Mostofa Akbar			
1	Asterik Based IP Telephony system (3 students)		
2	Android based Patient Care Application using sensors (3 students)		
3	Reconfigurable Stock Trading Application maintaining Software Quality		
Dr. Abu Sayed Md. Latiful Hoque			
1	e-Learning in Mobile Environment		2
2	Knowledge Discovery from Academic Data		2
3	Data Mining in Health Informatics		2
4	Problem-based e-Learning of Programming Language		2
Dr. Mohammad Mahfuzul Islam			
1.	Steganography	Securing multimedia contents is inevitable during communications. Cryptography transmits multimedia signals though changing its formats so that no one can recover the original text when the contents are in the path of transmission. However, the ill-motive users not only want to capture the theme of contents and alter, but target to destroy the data, if they could find the existence of any data in the channel. Steganography keeps data intact through hiding its existence. This is one of the hot-topic in current research domains.	2
2.	Biometric Security using fingerprint	Security is becoming the most important issue in the coming IT Era. All the information of the world is stored inside the computer. Information theft or unauthorized access to information is going to be the main crime in the time to come. So, access control is inevitable. Biometric security ensures the security of information by limiting its access through using Biometric organs like face, finger-print, retina, Body signals like ECG.	2
3.	Biometric Security using contactless hand verification		2
4.	Biometric Security using ECG		2
Dr. Masud Hasan			
1	Handling NP-complete problems (Group 1)	The main limitation of today's computers is that they cannot solve NP-complete problems in polynomial time. In many ways people tried to handle them, including approximation and parameterized algorithms, unconventional computing, etc. In this thesis we shall study those techniques and try to find	2

		related new results.	
2	Handling NP-complete problems (Group 2)	Same as above	2
3	Algorithms (Group 1)	We shall work on algorithms. Exact topic will be fixed after looking into the interest of the students.	2
4	Algorithms (Group 2)	Same as above	2
Dr. Mahmuda Naznin			
1	Challenges in Information Retrieval in Social Sensor Network	Blogs, Twitter, Facebook all are examples social networks. If any event occurs blog, twitter, facebook postings identify the event . But too much data may create confusion to find the level of intensity of the event. In this thesis we will study those issues.	2 or 3
2	Security Issues in Social Sensing	Social sensing sometimes suffers from different security challenges including finding the authenticated sources and reliable data. We will study those challenges.	2 or 3
3	Architecture of Social Sensor Network	We will study some existing Social Sensor Network Models and will identify the different components of a social sensor network.	2 or 3
Dr. A.K.M. Ashikur Rahman			
1.	On coverage heuristics for target monitoring in visual sensor networks.	Visual sensor networks are becoming extremely popular in a number of application domains due to their ability to self-configure. One of the areas of self-configuration is camera coverage control: how should cameras adjust their field-of-views to cover maximum targets? This is an NP-hard problem. Although several heuristics have been proposed, a little is known about the performance bounds of the existing heuristics. Moreover, there exist a number of weaknesses that influence both their coverage and overhead. In this research work, our goal is to develop analytical expressions devising worst case performance bounds of the existing heuristics. Then, we plan to propose computationally efficient centralized/distributed heuristic(s) that can provide near-optimal coverage for both under-provisioned and over-provisioned small-scale networks.	3
2.	Estimating topology size of *r*-	Several graph theoretic analysis on design	3

	neighborhood graph structures for wireless ad hoc networks.	and evaluation of tunable topology control algorithms have been proposed recently for wireless ad hoc networks. The main idea of such tunable graph structures is to trade sparsity (or node degree) for creating graphs with better properties in other dimensions (such as energy, delay, etc). One of the important graph structures, known as *r-neighborhood* graph, is a set of graphs that trade between energy and node degree in a tunable manner. However estimating graph size (and sparsity) of such structures has remained unexplored. The target of this research work is to fill this notable gap by proposing analytic models for estimating graph sizes.	
Dr. M. Sohel Rahman			
1.	Topics in Bioinformatics	Here the goal is to consider different topics in Bioinfirmatics and try to study and solve them. Such topics include, but are not limited to, DNA Fragment assembly, Aligner, Microarray Hybridization, protein folding, Sequence analysis etc. Huge programming will be involved. Some theoretical topic (less or no programming) may also be available (e.g., sorting by transposition/reversal etc.).	No Limit. Groups are allowed
2.	Metaheuristics for Hard Combinatorial Optimization Problems	Metaheuristic techniques will be employed to solve hard combinatorial problems. These problems are mostly NP-Hard and hence exact algorithms are not useful/feasible. These problems may come from any domain (networks, Bioinformatics, transportation, climate etc.). Huge programming will be involved.	No Limit. Groups are allowed
3	Problems on Strings and Sequences	Here the problems span from simple pattern matching to different variants of pattern matching, longest common subsequence to different variants thereof as well as string combinatorics. Here we can have pure theoretical work and we can have a mix of theory and programming.	No Limit. Groups are allowed
Dr. Mohammed Eunus Ali			
1	Social Network Data Analysis	From Tahrir Square to Shahbagh Square, social media (e.g., Facebook, Twitter) played a vital role in all major movements in recent days. In this thesis, we will	2

		investigate the evolution of such events in social media and see how these social media activities translate into real world movement. Through analysis, we will try to understand people's emotion of such movement, growth of such campaign, and identifying influential individual in such movement. (In Collaboration with Dr. Jalal Mahmud, IBM Research, Almaden USA)	
2	Visibility Queries on 3D Data	Recent advances in large-scale 3D modeling have enabled capturing of urban environments into 3D models (e.g., a virtual 3D city model). These 3D models give photo-realistic resembling of urban objects, i.e., the visual appearance of a virtual 3D model and its physical counterpart is verisimilar. The widespread availability of these realistic 3D datasets provide us an opportunity to answer many real-life user queries involving these datasets. In this thesis, we will build a system that will answer queries such as "what is the best position for a billboard?"and "which hotel room gives the best view?". (In Collaboration with Prof Dr. Yunjun Gao, Zheijiang Uni, China)	2
3	Consensus Queries on Location Based Social Network	The development of location based social computing (e.g., FourSquare) has introduced a new platform for accessing information collaboratively based on the current locations of participating users. Related social networking applications allow users to share their locations with others which enable a group of users to collaboratively search for an object of interest (e.g., a meeting place) that best suits the group. Depending on the circumstances, the group may opt for an answer that may not be optimal for all group members but suits most of them. In this thesis, we will focus on finding an efficient solution for finding the best subgroup of all possible groups, a generalization of spatial combinatorial search. (In Collaboration with Dr. Sarana Nutanong, Jons Hopkins University, USA	2
4	Trajectory Data Mining	Mining GPS traces or user location	2

		histories have been active research areas in recent years. These GPC traces provide vital information regarding users' behavior and travel patterns, which can be utilized in many useful applications such as friend recommendation, travel place recommendation, etc. Similarly, GPC traces of public transports such as taxis' trajectories have been used effectively in urban transport planning. In this thesis, we will develop techniques that will identify activities going on around us from the GPS traces of users/taxis. (In Collaboration with University of Melbourne)	
Dr. Md. Yusuf Sarwar Uddin			
1.	Communication networks exploit social networks	Exploiting the relationship among humans for effective content dissemination in a very large scale human-centric networks	2
2.	Disruption-tolerant networking for disaster response	Protocols for highly resource constrained edge networks formed by mobile people/vehicles	2
3.	Media crowd-sourcing for traffic behavior estimation	Developing a data acquisition toolkit for capturing pictures/videos for analyzing driving behavior in a busy traffic lane	3
4.	Prioritizing named content in constrained networks	Named data is a new communication paradigm for the Internet, which gives names to data objects rather than end hosts as in IP. This thesis studies the opportunities for content prioritization in the presence of resource constraints in such networks	2/3
Dr. Tanzima Hashem			
1	Privacy Preserving Location-based Services.	The accesses of location-based services (LBSs) via mobile devices such as iPhones and Androids have become an essential part of our daily lives. Although, these services make our lives more convenient, their access also enables a location-based service provider (LSP) to infer over time a comprehensive user profile with high degree of precision, which in turn creates a significant potential for privacy invasions. In this project, we will develop approaches that allow users to enjoy high quality LBSs in a privacy preserving manner.	2
2	Time Dependent Group Nearest Neighbor Queries in Road	Location-based services (LBSs) have been originally tailored for requests of a single	2

	Networks.	user, for example, asking for the closest gas station or the positions of traffic jams along a route. The advancement of LBSs has led to a new range of real-time services such as location-based social networking that enable a group of users to be involved in a single location-based query, for example, a group of friends may want to meet at a place such as restaurant that minimizes the total travel time for them. To avoid the rush hour of the traffic, the group may also want to know the best departure time that minimizes the total travel time for them. Given a time interval, a time- dependent group nearest neighbour query finds the best departure time and the location of the meeting place that minimize the total travel time for the group. In this project, we will develop efficient algorithms to evaluate time-dependent group nearest neighbour queries in road networks.	
3	Is Social Networking Site Stealing Your Family Time?	The advent of social networks such as Facebook, Google+ and Loopt allow a group of friends to remain connected from virtually anywhere at any time. The large varieties of social-networking applications are continuously attracting an increasing number of people to use social networking sites. Social networking sites have also changed our life style. Are we becoming unsocial in our family life by using social networking services? For example, now-a-days young generation are spending a major portion of their time at social networking sites and spending less time with their parents then before. Similarly, young parents are giving less time to their children and using that extra time at social networking sites. It seems that social networking sites are disturbing our personal space. It becomes more prominent if all family members do not equally use the social networking sites. Why is it happening? Is the attraction to social networking sites is turning to an addiction? Is the effect is more pronounced in developing countries due to	2

		digital divide? What could be the possible remedies to address this important concern? In this research project, we will investigate the impact of social networking activities on family lives and propose remedies to mitigate the effect.	
4	Privacy Preserving Trajectory Data Publishing.	The advancement and widespread use of location aware devices (e.g., GPS equipped mobile phone or vehicle) have enabled users to share their trajectories with others. Such trajectory data allows organizations and researchers to perform useful analyses for many applications such as urban planning, traffic monitoring, and mining human behavior. In this research project, we will develop anonymization methods for publishing trajectory data so that both user privacy and data utility are maintained.	2
Dr. Md. Shohrab Hossain			
1	Security Issues and protection mechanisms of IP mobility protocols		2
2	Study of Network-based localized mobility solutions and Dual Stack Mobile IPv6		2
3	Study of WiMAX and LTE technologies and their issues		2
Dr. S. M. Farhad			
1	Orchestration of Stream Programs on GPUs	Introduction: While multicore hardware has become the industry standard, parallel programming models for exploiting parallelism have lagged. Stream processing is one programming model that expresses a computation in the form of actors that interact through data channels. Stream processing is suitable for applications that exhibit regular sequences of data, including multimedia, graphics, signal processing and networking applications. It is challenging to execute the stream programs efficiently on multicores, due to the existence of bottlenecks in stream programs and the hardness of assigning actors of stream programs on available cores. Hence, it is essential to orchestrate the execution of stream programs. Orchestration of stream programs on graphics processing units (GPUs) has	2

		many challenges as GPUs have many levels of parallelism. Efficient execution of stream programs on GPUs is an interesting problem. For more information please visit http://sydney.edu.au/engineering/it/~smfarhad/Presentation.html	
2	Design and implement TCP Offload Engine in GPGPU	**TCP offload engine** or **TOE** is a technology used in network interface cards (NIC) to offload processing of the entire TCP/IP stack to the network controller. It is primarily used with high-speed network interfaces, such as gigabit Ethernet and 10 Gigabit Ethernet, where processing overhead of the network stack becomes significant. The term, TOE, is often used to refer to the NIC itself, although circuit board engineers may use it to refer only to the integrated circuit included on the card which processes the TCP headers. TOEs are often suggested as a way to reduce the overhead associated with IP storage protocols such as iSCSI and NFS. The problem is to optimize the operating system is design and implementation of efficient tcp and udp offload engine using GPGPU. For information follow the links http://en.wikipedia.org/wiki/TCP_offload_engine	2
3	Human Health Monitoring and Reporting System in Android	Human health monitoring by mobile device is an interesting area in recent technology trend. Interfacing such a sensing and reporting system with the mobile system is a demanding technology as found in the following link.	2
Dr. Md. Monirul Islam			
1	Image Resolution Enhancement in Wavelet Domain	Students must take CSE 433	1-2
2	Recognition of Handwritten Bangla Script	Students must take CSE 433	1-2
3	Vehicle License Plate Recognition in Hazardous Condition	Students must take CSE 433	1-2
4	Fingerprint Analysis/Recognition/Enhancement	Students must take CSE 433	1-2

Dr. A. B. M. Alim Al Islam			
1	Road traffic simulator	Bangladesh, in particular its capital Dhaka, is widely known for traffic jam. Analytical studies on such traffic jam has the potential to lead towards a solution, which can significantly diminish the extent of sufferings resulted from the jam. In this thesis, we will explore the viability of such analytical study through investigating applicability of currently-used road traffic simulator in the context of Bangladesh. If the currently-used road traffic simulators are not applicable, which may happen due to various phenomena observed over the roads in Bangladesh, we will develop our own simulator. Subsequently, on the basis of our simulation outcomes, we will attempt to lead towards a probable solution for the traffic jam in Dhaka.	2
2	Pollution detection using sensor networks	Bangladesh is one of the countries in the world, which are under severe threat of sufferings from different consequences of environmental pollutions. To battle against such sufferings, the first task is to judiciously detect the extent of the pollutions. Keeping this in mind, in this thesis, we will attempt to assess the viability of utilizing wireless sensor networks for detecting three different types of pollutions: water pollution, soil pollution, and air pollution.	2
3	Wireless underground sensor networks	Wireless underground sensor networks have come under wide investigation in recent times due to their different applications, while having a number of research challenges. In this thesis, we will specifically focus on three of the challenges - energy efficiency, throughput optimization, and reliable topology management.	2
4	Fault tolerance in wireless mesh networks	In the last few years, the effort in researches on wireless mesh networks has grown significantly high due to numerous contemporary and future applications of such kind of networks. However, reliability of the networks is one of the few areas, which are little explored. Therefore, in this thesis, we will investigate reliability of the wireless mesh	2

		networks, considering their different types of architectures. We mainly focus on simulation-based (preferably in ns-2) studies. We will also explore testbed-based evaluation, if possible.	
1	Road traffic simulator	Bangladesh, in particular its capital Dhaka, is widely known for traffic jam. Analytical studies on such traffic jam has the potential to lead towards a solution, which can significantly diminish the extent of sufferings resulted from the jam. In this thesis, we will explore the viability of such analytical study through investigating applicability of currently-used road traffic simulator in the context of Bangladesh. If the currently-used road traffic simulators are not applicable, which may happen due to various phenomena observed over the roads in Bangladesh, we will develop our own simulator. Subsequently, on the basis of our simulation outcomes, we will attempt to lead towards a probable solution for the traffic jam in Dhaka.	2