CS1340: Computer Networks (Monsoon 2023), Mahavir Jhawar, Ashoka University					
Date	**Time**	**Test Code**	**Total Marks**	**Maximum Marks**	**Weightage**
October 31, 2023	10 PM	CS1340_A3	30 + 15 = 45	30 + 15 = 45	10% + 5% = 15%

▶ **Take-home Task** Develop a pair of TCP-based client-server programs to implement the following application. Section 1 describes the curriculum structure of the 4-year BSc Hons degree in Computer Science at Ashoka university [1]. The server-side application must implement a service that allows any user (using the client-side application) to make queries about the new curriculum.

The assignment requires you to frame 10 meaningful questions (3 sample questions are given below) which the server can upfront present to any connecting client. Afterwards, it allows the connecting client query these questions.

1. What is the total number of CS credits required to complete the 4-year BSc Hons degree in CS?
2. Could you provide a breakdown of CS credits ?
3. What are the core courses ?
4.
5.
6.
7.
8.
9.
10.

[Marks = 30]

▶ **Follow-up in-class programming quiz on the take-home task** You will be asked to enhance your application with some additional functionality.

Important Note Our assumption is that if one carries out the take-home task with a good understanding, then the follow-up task is easily doable. Failing to complete the latter will result in marks deducted from the take-home task. [Marks = 15]

Note: Section 2 contains a sample assignment (of similar type) from the Monsoon 2022 iteration of the course. We also provide access to one of the student submissions.

1 The 4-Year BSc Hons

The 4-year BSc Hons degree in Computer Science mandates a minimum of 150 credits for completion, ensuring a well-rounded education encompassing both core computer science knowledge and broader academic experiences.

These credits are classified into two categories:

- Academic Credits (144): A minimum of 144 academic credits. These credits are divided into three categories - FC credits (36), CS credits (86), and Open credits (22).
    - FC Credits (36): A total of 36 credits dedicated to foundational courses
       (https://www.ashoka.edu.in/programme/foundation-courses/)

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[1]please note that these requirements are tentative and not yet finalised, but this is not important for this assignment

Total Credits					
150					
Academic Credits			Non-academic Credits		
144			6		
FC Credits	CS Credits	Open Credits	Co-curricular Credits		Internship Credits
36	86	22	4		2
	Core Project Electives				
	70 4 12				

Credits Breakup for the 4 Year BSc Hons Program in CS

- **CS Credits (86):** A minimum of 86 credits from the Computer Science Department, divided as follows:
    - The student must complete 74 credits of CS core courses given in §1.1
    - Additionally, take a minimum of 12 credits in CS elective courses.
    - Students need to achieve a minimum grade of "B" in both Introduction to Computer Science and Discrete Mathematics courses.
- **Open Credits (22):** The remaining 22 academic credits can be earned by taking courses from any department within the university, including the Computer Science Department.
- **Non-Academic Credits (6):** A minimum of 6 non-academic credits. They include
    - 4 credits designated for co-curricular courses
    - 2 credits allocated for internship experience

1.1   Computer Science Core for 4 Year BSc Hons

Core Courses	Credits
Basic Science and Maths	
P&S	4
Linear Algebra	4
Calculus	4
Physics *	4
Biology **	4
Computational thinking	
Introduction to Computer Science	4
Discrete Mathematics	4
Data Structures and Algorithms	4
Introduction to Machine Learning	4
Data Science and Management	4
Theory of Computation	4
Design and Analysis of Algorithms	4
Programming Languages and Translation	4
Information Security	2
Systems and software	
Computer Organisation and Systems	4
Design Practices in CS	4
Computer Networks	4
Embedded Systems	4
Capstone Project	4
Total	74
* - To be decided	
** - To be decided	

1.2 Example Path for 4 Year BSc Hons.

Monsoon Semester	Spring Semester
1st Semester	**2nd Semester**
Calculus	Introduction to Computer Science
	Discrete Mathematics
3rd Semester	**4th Semester**
Probability and Statistics	Theory of Computation
Linear Algebra	Computer Organisation and Systems
Data Structures and Algorithms	
5th Semester	**6th Semester**
Design Practices in CS	Design and Analysis of Algorithms
Introduction to Machine Learning	Data Science and Management
Computer Networks	Embedded Systems
Information Security (2 credits)	
7th Semester	**8th Semester**
Capstone Project	
Programming Languages and Translation	
** Incorporate one Physics and one Biology course, along with 12 credits of Computer Science electives, within your four-year curriculum in addition to the mentioned courses	

1.3 Core Course Prerequisites in Computer Science

Course	Pre-requisites	Remarks
P&S	Mathematics in Grades XI and XII. Alternatively, Quantitative Reasoning and Mathematical Thinking (FC 0306) + Calculus Enabler (MAT 1000)	
Linear Algebra	Check with the Mathematics Department	
Calculus	Check with the Mathematics Department	
Physics		
Biology		
Introduction to Computer Science	Mathematics in Grades XI and XII. Alternatively, a minimum of B grade in both Quantitative Reasoning and Mathematical Thinking (FC 0306) and Calculus (MAT 1000)	
Discrete Mathematics	Mathematics in Grades XI and XII. Alternatively, a minimum of B grade in both Quantitative Reasoning and Mathematical Thinking (FC 0306) and Calculus (MAT 1000)	
Data Structures and Algorithms	Introduction to Computer Science; Discrete Mathematics	
Theory of Computation (ToC)	Data Structures and Algorithms	
Computer Organisation and Systems	Introduction to Computer Science	
Introduction to Machine Learning	Probability and Statistics; Linear Algebra; Data Structures and Algorithms	
Design Practices in CS	Data Structures and Algorithms; Computer Organisation and Systems	
Computer Networks	Introduction to Computer Science; Data Structures and Algorithms	
Information Security	Data Structures and Algorithms; Probability and Statistics	
Design and Analysis of Algorithms	Data Structure and Algorithms; Linear Algebra	
Data Science and Management	Data Structures and Algorithms; Introduction to Machine Learning	
Programming Languages and Translations	Data Structures and Algorithms; Theory of Computation	
Embedded Systems	Computer Organisation and Systems	

2 Sample Assignment from Monsoon 2022

▶ Mandatory Part ─────────

1. Implement a client-server application with the following requirements:

   (a) **Server Side** The server side application implements the following services:
   - Service#1

     > **Input**
     > Course code of a CS core course
     > ** 10 core courses
     > **Output**
     > A list of pre-requisites (course codes)

   - Service#2

     > **Input**
     > (X, Y), where $X \in \{Monsoon, Spring\}$ and $Y = 2022$
     > **Output**
     > All CS courses offered in Semester (X, Y) (with course codes)
     > ** You may get this data from AMS

   (b) **Client Side** The client-side program can be used to remotely connect the server side program and make use of both Service#1 and Service#2.

▶ Optional Part ─────────

2. Implement a first-time registration and authentication functionality into this system.

   - **Registration** Implement registration step for email id under the domain @ashoka.edu.in. This step issues passwords to the registered users.

   - **Authentication** A valid password is required to access the above services.

▶ Sample Solution ─────────

The client-server programs as part of a student submission are available at `https://drive.google.com/file/d/1N66sDCwDeaPznslN8z3W_i6pScKdqzyK/view?usp=sharing`

Assessment Schedule (Tentative)

Date	Activity	Weightage
September 15	A1	5%
September 29	A2	10%
October 31	A3	15%
TBD	A4	??%
TBD	A5	??%
TBD	A6	??%
October 4	Mid Term Exam	20%
TBD	Final Term Exam	20%

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