

Module 1: Computational Thinking

Computational Thinking Competencies

Computational: Involving the calculation of answers, amounts, results (e.g., calculations, order)

Thinking: The activity of using your mind to consider something (e.g., reasoning, questioning)

Competencies: Important skills that are needed to do a job (e.g., managerial competencies)

Includes:

1. Abstraction

- Identifying and utilizing the structure of concepts / main ideas
- Simplifies things
 - o Identifies what is important without worrying too much about the detail
- Allows us to manage the complexity of the context or content
- Biological Domain
 - o **Bioinformatics:**
Combines different fields of study, including computer sciences, molecular biology, biotechnology, statistics, and engineering
Analyse large amount of data: Genomics, Proteomics
- Computer Science Manifestations
 - o **Pseudocode:**
An informal description of the steps involved in executing a computer program, often written in something similar to plain [in designed language]
- Human Genomes
 - o Structure of cell: Incredibly crowded and incomprehensible for humans
 - o Simplify the representation of cells and make it readable by abstraction (labelling, lettering, shaping, colouring, numbering, etc.)
 - o Formulating in pseudo level can enable us to understand concepts more clearly.
 - o Abstraction simplifies complex life phenomenon to something readable and understandable.

2. Algorithms

- is about following, identifying, using, and creating an ordered set of instructions
- ordering things
 - o ascending order (e.g., from 1 to 5, or from A B C to X Y Z)
 - o descending order (e.g., from 5 to 1, or from Z Y X to C B A)
- Allows us to order the complexity of the context or content
- Biological Domain

- Transcription, Translation
- Prediction (Gene Function, Protein Function)
- Computer Science Manifestations
 - IF ELSE
 - Algorithm efficiency

3. Decomposition

- Breaking down data, processes, or problems into smaller and more manageable components to solve a problem
- Each subproblem can then be examined or solved individually, as they are simpler to work with
- Natural way to solve problems
- Also known as divide-and-conquer to synthesize the final solution
- Solve complex problems
 - If a complex problem is not decomposed, it is much harder to solve at once. Subproblems are usually easy to tackle
- Each subproblem can be solved by different parties of analysis
- Decomposition forces you to analyse your problem from different aspects
- Biological Domain
 - Biological decomposers (Fungi, Bacteria)
- Computer Science Manifestations
 - Functions
 - Factorials

4. Pattern Recognition

- is about observing patterns, trends and regularities in data
- A pattern is a discernible regularity
 - The elements of a pattern repeat in a predictable manner
- In computational thinking, a pattern is the spotted similarities and common differences between problems
- It involves finding the similarities or patterns among small, decomposed problems, which can help us solve complex problems more efficiently
- Patterns make problems simpler and easy to solve
- Problems are easier to solve when they share patterns, we can use the same problem-solving solution wherever the pattern exists
- The more patterns we can find, the easier and quicker our problem solving will be
- Biological Domain
 - Gene finding
 - Biomarkers
 - Protein synthesis
- Computer Science Manifestations
 - Machine learning
 - Artificial intelligence
 - Probability and statistics

LAMS questions

1. Which of the following is used in the process of computational thinking?

Which of the following is used in the process of computational thinking?

*

Choose one of the following answers.

☐ Algorithm

☐ Decomposition

☐ Abstraction

☐ Pattern recognition

✓ ☒ All of the above

That is correct! Algorithm, decomposition, abstraction and pattern recognition are all computational thinking competencies.

1. 1 In which of the following disciplines can you see computational thinking application?

In which of the following disciplines can you see computational thinking application?

*

Choose one of the following answers.

☐ Biology

☐ Economics

☐ Arts

☐ Engineering

✓ ☒ All of the above

That's correct! Computational thinking can be applied across all these disciplines and more.

1. 2

What is abstraction in computational thinking concept? Check all that apply.

*

Choose at least one answer.

✓ ☒ Pointing out necessary information

✓ ☒ Simplifying the complexity

✓ ☒ Filtering out irrelevant detail

You're getting there! All the options are descriptions of what abstraction is as a computational thinking competency.

1. 4 Which of the computational thinking competency allows you to break down a complex phenomenon into smaller chunks to solve a problem?

Which of the computational thinking competency allows you to break down a complex phenomenon into smaller chunks to solve a problem?

*

Choose one of the following answers.

☐ Abstraction

☐ Algorithms

✓ ☒ Decomposition

☐ Pattern Recognition

☐ None of the above

That's correct! Decomposition helps us to break down a problem into smaller chunks so that we can divide and conquer complexity.

1. 5 Which of the following example(s) illustrates pattern recognition? Check all that apply.

Which of the following example(s) illustrates pattern recognition? Check all that apply.

*

Choose at least one answer.

☐ Ascending the numbers

☐ Asking students to evaluate the locations of volcanoes and earthquakes across the globe

✓ ☒ Having students to learn colors and shapes by clustering them

☐ Grouping students randomly

1. 6 How does computational thinking benefit us the most?

How does computational thinking benefit us the most?



Choose one of the following answers.

- ☐ To learn computer programing
- ☐ To think like a machine or computer
- ✓ ☒ To solve complex problems by using specific techniques
- ☐ None of the above

That's correct! While computational thinking may support us in learning computer programing or to think like a machine or computer, it is most helpful in providing us with specific techniques to solve complex problems found in various aspects of our lives.

1. 1 Baking a cake by following its step-by-step instructions is a good example of...

Baking a cake by following its step-by-step instructions is a good example of...



Choose one of the following answers.

- ✓ ☒ Algorithms
- ☐ Pattern recognition
- ☐ Decomposition
- ☐ Abstraction

Algorithm is a step-by-step process while solving a problem.

2. 1 A MRT map is a good example of...

A MRT map is a good example of...



Choose one of the following answers.

- ✓ ☒ Abstraction
- ☐ Pattern recognition
- ☐ Algorithms
- ☐ Decomposition

Abstraction allows us to simplify the complexity and bring up relevant necessary information.

3. 1 Breaking down choreographic forms of dance into smaller acts (e.g., narrative, canon, retrograde) is an example of...

Breaking down choreographic forms of dance into smaller acts (e.g., narrative, canon, retrograde) is an example of...



Choose one of the following answers.

- ☐ Pattern recognition
- ☐ Abstraction
- ✓ ☒ Decomposition
- ☐ Algorithms

Decomposition is a breaking down process while solving a problem.

4. 1 Pairing up your socks back together is an example of...

Pairing up your socks back together is an example of...



Choose one of the following answers.

- ✓ ☒ Pattern recognition
- ☐ Algorithms
- ☐ Abstraction
- ☐ Decomposition

Pattern recognition helps us to match up the right sock pairs.

1. 2 Evaluating the locations of volcanoes and earthquakes across the globe to find out similarities is a good example of...

Evaluating the locations of volcanoes and earthquakes across the globe to find out similarities is a good example of...

*

Choose one of the following answers.

☐ Decomposition

☐ Algorithms

☐ Abstraction

✓ ☒ Pattern recognition

Pattern recognition helps us to find the similarities across locations.

2. 2 Grouping given items according to their colors and shapes is a good example of...

Grouping given items according to their colors and shapes is a good example of...

*

Choose one of the following answers.

☐ Algorithms

☐ Abstraction

☐ Pattern recognition

✗ ☒ Decomposition

Pattern recognition helps us to group items in the same category.

1. 3 Computational thinking applications are more applicable in the computer science field.

Computational thinking applications are more applicable in the computer science field.

*

Answer:

✗ ☐ True

✓ ☒ False

Computational thinking applications are applicable in any discipline.

2. 3 Computational thinking requires knowing technical skills.

Computational thinking requires knowing technical skills.

*

Answer:

✗ ☒ True

✓ ☐ False

You do not have to have any technical skills to understand computational thinking.

1. 4 What are the benefits of computational thinking competencies?

What are the benefits of computational thinking competencies?

*

Choose one of the following answers.

✓ ☒ It enables us to understand how to solve complex problems.

☐ It enables us to know how to use the computer.

☐ It enables us to understand how programming works.

☐ It enables us to know how computer parts work.

Computational thinking competencies allow us to solve complex real-world examples.

2. 4 Computational thinking application may facilitate improving (check all that apply)

Computational thinking application can facilitate improving our...
(Check all that apply)

*

Choose at least one answer.

☐ Interdisciplinary connections

✓ ☒ Thinking skills

✓ ☒ Problem-based learning skills

Computational thinking competencies allow us to improve not only our interdisciplinary connections, but also our problem-based learning and thinking skills.

3. 4 Computational thinking competencies allow us to (check all that apply)

Computational thinking competencies allow us to....
(Check all that apply)



Choose at least one answer.

- ✓ ☒ Analyze what the problem is
- ✓ ☒ Construct possible solutions
- ✓ ☒ Identify a complex problem

Computational thinking competencies allow us to identify complex problems, detect the type of problem, and develop potential solutions to solve the problem.

Module 2: Quantitative Reasoning

Quantitative Reasoning

Steps to obtain the desired insights

- How to **frame** concrete numerical questions?
- How to **identify** tools and data for analysis?
- How to **build** models to analyse the data?
- How to **analyse** the results you obtain?

Mean

- The “**average**” behaviour of the data points, and is computed as “average” as well
- **Single point statistic from entire data distribution**

Standard deviation

- The **average deviation of a data point from the Mean** of the distribution
- **Higher SD, wider distribution**

Correlation

- **$-1 \leq 0 \leq 1$**
- Margin of error is **narrower/stronger correlation** when CORR closer to **-1 or 1**
- **The higher the correlation, the lower the standard error.**

LAMS questions

1. 1 Which of the following real-life questions can be considered as quantitative reasoning problems?

Which of the following real-life questions can be considered as quantitative reasoning problems?



Choose at least one answer.

- ☒ Which canteen stall to queue up for lunch if I am in a hurry?
- ☒ When should I start from home to reach school on time?
- ☒ Should I buy health insurance at my current age, or wait?

Every problem mentioned in the question requires you to think quantitatively. In case of health insurance, you need to estimate the risk and gain based on probabilities. In case of time estimates, you need to know about routes and traffic flows. In case of canteen queues, you need to know about the processing time for the food as well as service time depending on the rush and manpower.

1. 2 Arrange the following steps in order, as they are considered while solving a quantitative reasoning problem.

Arrange the following steps in order, as they are considered while solving a quantitative reasoning problem.



Sort answers in the right order (click on the answers to drag-and-drop in order).

- ☒ Framing concrete numerical questions
- ☒ Identifying tools and data for analysis
- ☒ Building models to analyse the data
- ☒ Analysing the results you obtained

1. 4 Suppose you find that the mean time for headache subsiding in case of drug trials is just 2 minutes and the mean for headache subsiding in case of placebo is 20 minutes. Which of the following is true in this case?

Suppose you find that the mean time for headache subsiding in case of drug trials is just 2 minutes and the mean for headache subsiding in case of placebo is 20 minutes. Which of the following is true in this case?



Choose one of the following answers.

- ☐ Taking the drug will never result in subsiding the headache in time lower than placebo.
- ☒ Taking the drug results in a lower time for subsiding the headache on an average.
- ☐ Taking the drug will always result in a lower time for the headache to subside.
- ☐ Taking the drug results in a lower time for subsiding the headache most of the time.

Only lower on an average. We can't claim any of the other three cases without further information.

1. 5 What does Standard Deviation of a distribution signify?

What does Standard Deviation of a distribution signify?



Choose one of the following answers.

- ☐ The extreme behaviour of the data points.
- ☒ The "deviation" of data points from the average.
- ☐ The behaviour of data points "on an average".
- ☐ The behaviour of each individual data point.

Standard Deviation is the average deviation of a data point from the Mean of the distribution, computed as follows.
 $SD = \sqrt{\sum (\text{data point} - \text{mean})^2}$

2. 5 What does Mean of a distribution signify?

What does Mean of a distribution signify?



Choose one of the following answers.

- ☐ The "deviation" of data points from the average.
- ☒ The behaviour of data points "on an average".
- ☐ The extreme behaviour of the data points.
- ☐ The behaviour of each individual data point.

Mean is quite literally the "average" behavior of the data points, and is computed as "average" as well.

1. 6 What do you think is the probability (chance) of a data point being 7 Standard Deviations away from the Mean? Take a guess or search online for a technically correct estimate.

What do you think is the probability (chance) of a data point being 7 Standard Deviations away from the Mean? Take a guess or search online for a technically correct estimate. *

Choose one of the following answers.

- ☒ ☐ Probability 1/1000000, that is, 1 in a Million.
- ☐ Probability 1/10, that is, chance of 1 in 10.
- ☐ Probability 1/1000000000, that is, 1 in a Billion.
- ☐ Probability 1/100, that is, chance of 1 in 100.

Shocked? It is actually even less! Go through the remaining portion of the lesson to see how we use this.

1. 7 We found that the drug is not identical to the placebo in case of our headache trials. This means the drug actually works in case of headaches better (faster) than placebo. Will you now take the drug for headache?

We found that the drug is not identical to the placebo in case of our headache trials. This means the drug actually works in case of headaches better (faster) than placebo. Will you now take the drug for headache? *

Choose at least one answer.

- ☐ Yes, of course. The drug will surely work for me in case of headaches.
- ☒ Not sure yet. The drug works better in general, but will it work for me?
- ☐ Not sure yet. Need to perform a cost-benefit analysis if I know the price.
- ☐ Not sure yet. The drug reduces the time only by 4 minutes on an average.

The trials and statistics only provides you with numeric analysis of the problem. But decision making is a bigger challenge, and often your individual preference.

1. 2 Suppose you find that the mean marks obtained by students in your class is 75, while the standard deviation is 5. If there are 500 students in your class, then roughly how many of them scored between 70 to 80, if you assume a bell curve?

Suppose you find that the mean marks obtained by students in your class is 75, while the standard deviation is 5. If there are 500 students in your class, then roughly how many of them scored between 70 to 80, if you assume a bell curve? *

Choose one of the following answers.

- ☐ My guess will be about half of the class, that is, 250.
- ☐ Maximum students score within that range, so 450.
- ☐ No one scored within that range, as it is too narrow.
- ☒ Must be close to 68% for Mean +/- SD, that is, 340.

If you assume a distribution is like a bell-curve, that is, if you have a Normal/Gaussian distribution, then the number of data points within the band of Mean – SD to Mean + SD is expected to be 68% of the total data points. This is a property of Normal/Gaussian distributions.

1. 3 Area has a correlation of 0.76 with Price, while Quality has a correlation of 0.81 with Price. Area has a prediction error (standard error) of 51503 for Price. What do you think will be the error in case of predicting Price using Quality?

Area has a correlation of 0.76 with Price, while Quality has a correlation of 0.81 with Price. Area has a prediction error (standard error) of 51503 for Price. What do you think will be the error in case of predicting Price using Quality? *

Choose one of the following answers.

- ☐ Errors are not at all related to the correlations.
- ☒ Must be less than 51503, but not sure how much.
- ☐ Error should be about half, that is, around 25000.
- ☐ Error can be same as the standard error for Area.

Correlation does matter in case of standard error for prediction, and the higher the correlation, the lower the standard error. So, it will surely be lower.

1. 4 Suppose you model you score for a course as follows.

Suppose you model you score for a course as follows.

Score = 5 x ClassTime/Week + 3 x RevisionTime/Week + 50

If the classes run for 3 hours a week, how much revision time would you need per week to score above 80?

Choose one of the following answers.

☒ For Score > 80, we need RevisionTime/Week > 5 h.

☐ The relationship is not provided in the given model.

☐ For Score > 80, we need RevisionTime/Week < 5 h.

The model gives you an estimate of score based on the features ClassTime and RevisionTime per week. Thus, we can calculate the features required to obtain a specific value (or range) of the response.

$$80 < 5(3) + 3 \times RT + 50$$

$$15 < 3RT$$

$$3RT > 15$$

$$RT > 5 \text{ hrs}$$

Module 3: Cybersecurity

Phishing

- Check who the **sender** of the email is
- Be **cautious before clicking on any hyperlinks** (Type the correct address yourself to ensure you are viewing the actual website)
- Look out for the **lock icon in the address bar** to ensure the website starts with **https**
- Report suspicious email to **ServiceNow@NTU**
- **Delete** the email
- **Do not forward** the email to anyone
- CIA
 - o **C: Confidentiality**
Protect personal information and share only what is necessary
 - o **I: Integrity**
Practice cyber hygiene and beware of fake sources of information
 - o **A: Availability**
Prevent getting locked out of devices, your actions can affect others

Strong Passwords

- At least **8 characters long**
- Contains **number**
- Contains **symbols**
- Contains **upper case letters**
- Contains **lower case letters**
- Use **uncommon and nonstandard words** or create a password **from a sentence that makes sense to you**
- **Do not use personal information** that people who know you can guess as your password
- Use **different passwords for different accounts**
- **Change passwords regularly**
- Use **Two Factor Authentication** or Multi Factor Authentication (MFA)
 - o By enrolling your mobile number or email address to receive a **one-time password**, or through an authentication app

Data Security

- Data can exist in both **physical** and **digital forms**
- Data can belong to an **individual** or an **organization**
- Levels of Data Security
 1. **Open:**
Data distributed to the **public** or **published on the internet**
 2. **Restrict:**

Data made accessible to members to the community and not to the public (project reports, presentation files)

3. Confidential:

Contractually defined as confidential or by nature confidential (personal identifiable information, audit reports)

If data is disclosed, target can face statutory penalties, cause damage to the organization

4. Classified:

Data covered under the Official Secrets Act

Unauthorised disclosure leads to damage to national security

- Lock workstations when leaving desk
- Adopt clean desk policy and keep desk clear
- Send and store work information through organizational accounts
- Keep data storage devices securely
- Secure sensitive digital information through encryption

Acceptable IT Usage

- Use trusted Wi-Fi networks
- Avoid doing sensitive transactions
- Use BCC instead of CC when sending mass emails to keep the identities confidential, especially when a third party is involved
- Be mindful when connecting external devices to computer as it may contain viruses and malware
- Install antivirus software and always ensure it is up to date

Cybersecurity in NTU

Objectives:

- **Confidentiality:** Ensuring Data and Information cannot be read by unauthorised personnel
- **Integrity:** Data and Information held by NTU remains accurate and unmodified by unauthorised personnel
- **Availability:** Data and Information remains usable with sufficient capability to deliver educational services

Functions:

- **The Cyber Security Governance:** Responsible for development and maintenance of NTU Cyber security policies, standards and procedures
- **The Cyber Security Engineering:** Responsible to explore different technologies to enhance NTU security capabilities
- **The Cyber Security Defence Team:** Manage university Security Operations Centre (SOC). Operates 24/7 365 Days to detect and responds to any cyber-attacks against NTU

Acceptable IT Usage Policy (AIUP):

- serves to **protect information and IT resources**
- **reduce the risks and damages** to the university by **governing the usage of all its IT resources** (computer, email account, mobile devices, IT services)
- **Dos**
 - o **Update** your passwords regularly
 - o Always ensure that you **keep your password safe**
 - o Use the **NTU email** for all **official communications**
 - o Use Blind Carbon Copy (**BCC**) for mass emails
 - o Keep **your software updated with security patches**
- **DONTs**
 - o **Don't share your password** with anyone
 - o **Don't forward any University document** to your **personal email address** or **online storage** that's **not approved** by the University
 - o Don't install software **without appropriate licenses**
 - o **Don't turn off** your anti-virus software or **cancel** any software updates
 - o **Don't over share** information in social media
- **Good habits**
 - o **Spot the signs of phishing emails**
 - o Use **strong passwords**
 - o Enable **MFA**
 - o Secure your **sensitive digital information through encryption**
 - o Follow the **AIUP** and conform to the security best practices

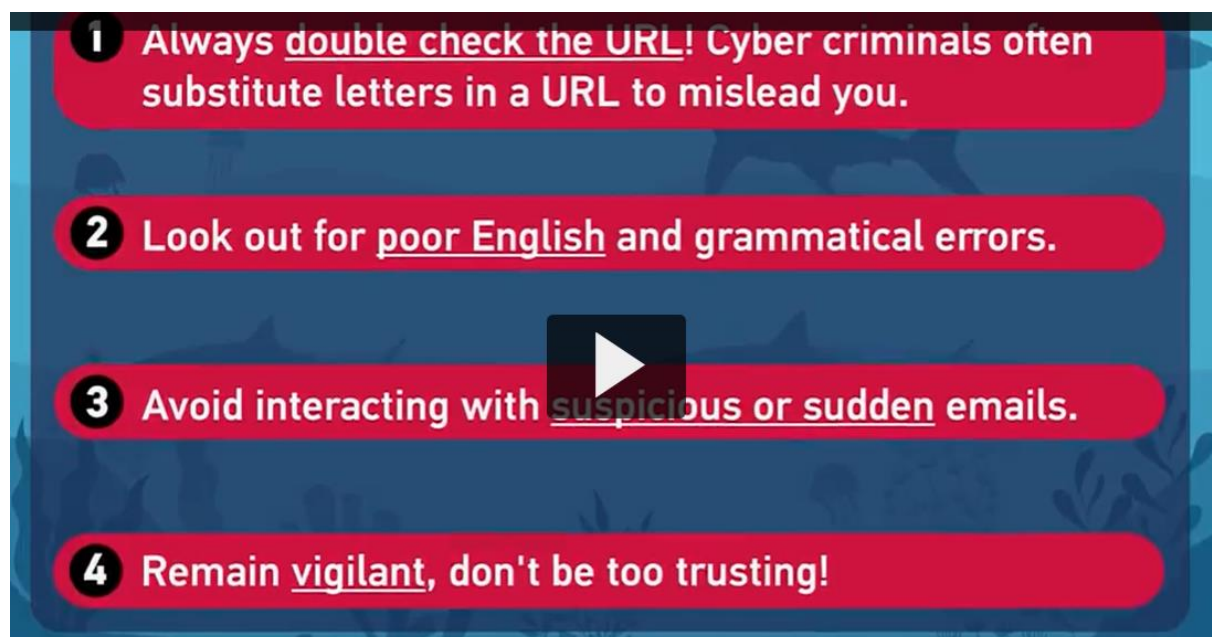
In General

P: Passwords

A: Anti-Virus

S: Software Application

S: Spot signs of phishing



LAMS questions

1. Q1.1 Cyber security refers to _____ implemented by an organisation to protect its cyber assets from damage, malicious attack and unauthorised access. Select all that apply.

Cyber security refers to _____ implemented by an organisation to protect its cyber assets from damage, malicious attack and unauthorised access. Select all that apply. *

Choose at least one answer.

✓ ☒ processes

✓ ☒ technologies

✓ ☒ practices

Cyber security refers to the technologies, processes and practices that are put in place to protect data, devices, programs or networks from damage, malicious attack and unauthorised access.

1. Q1.2

Please identify the strongest password combination from the following. *

Choose one of the following answers.

☐ P@ssw0rd

☐ S1ng@Pore

☐ password

✓ ☒ c3V@6t!G

Answer: c3V@6t!G

We recommend the use of such unique combinations (letters, numbers, mixed case, special characters) that will enable your account to withstand relentless attacks by hackers.

1. Q1

Data is only available in digital format. *

Answer:

✗ ☐ True

✓ ☒ False

Data refers to information processed by a computer. Information can be in physical (e.g., text documents, images) or digital (e.g. audio clips, software programs) format.
Answer: False

2. Q2.1 Data is classified into four levels of security. What are the four levels?

Data is classified into four levels of security. What are the four levels? *

Choose one of the following answers.

☐ Public, Internal, Sensitive, Top Secret

☐ Open, Internal, In-confidence, Highly Confidential

✓ ☒ Open, Restricted, Confidential, Classified

☐ Open, Restricted, Confidential, Secret

For a recap of the four levels of data classification, please watch the video on Data Security again.

1. 1 What are the main objectives of the NTU Cybersecurity team? Select all that apply.

What are the main objectives of the NTU Cybersecurity team? Select all that apply.



Choose at least one answer.

✓ ☒ Confidentiality

✓ ☒ Availability

☐ Accountability

✓ ☒ Integrity

The NTU Cybersecurity team aims to achieve:

1. Confidentiality - Ensure data or information cannot be read by unauthorized personnel.
2. Integrity - Data or information held by NTU remains accurate and unmodified by unauthorized personnel.
3. Availability - Data or service remains usable with sufficient capability to deliver our educational services.

These objectives are highly applicable across society and are the key considerations for many other organizations when managing cybersecurity.

1. Q2.1

What is the key purpose of Blind Carbon Copy (BCC)?



Choose one of the following answers.

☐ To keep someone in the loop even if a message does not directly concern them

✓ ☒ To keep the identities of the recipients confidential

☐ Meant for recipients who are required to take action in response to your email

Answer: To keep the identities of the recipients confidential

The use of BCC can be applied when sending impersonal emails, such as announcements, to a large list of people who may not know one another. This is a polite gesture that respects the privacy of the receivers – protecting their identities while avoiding chain email communications that may be irrelevant to them.

2. Q1.1 Which of the following statement best describes how we can reduce the risk of being hacked when connected to a public Wi-Fi network?

Which of the following statement best describes how we can reduce the risk of being hacked when connected to a public Wi-Fi network?



Choose one of the following answers.

☐ Always use trusted public Wi-Fi networks

☐ Avoid doing any sensitive transactions e.g. internet banking

☐ Ensure that your device has an up-to-date antivirus software

✓ ☒ All of the given options

1. 2 Which of the following actions aligns with the Acceptable IT Usage Policy (AIUP)? Select all that apply.

Which of the following actions aligns with the Acceptable IT Usage Policy (AIUP)? Select all that apply.



Choose at least one answer.

✓ ☒ Use Blind Carbon Copy (BCC) when sending mass emails

✓ ☒ Do not forward any university document to your personal email address

☐ Share your passwords with close friends only

It is a violation to the AIUP to share your password with **anyone**.

Don't feed the Phish!

How to detect a Phishing Email



1. Look at the email address, not just the sender!

2. Mismatched information

3. Usage of urgent or threatening messaging

4. Suspicious weblink

5. Poorly written email

If you think you have clicked on a phishing link or have visited any phishing website, please reset your password immediately at <https://pwd.ntu.edu.sg>

For further investigation, please submit an incident to ServiceNow@NTU
<https://servicenowatntu.ntu.edu.sg>

Library Notice

JY NTU Library <NTU@ge.se>
13/10/2020 2:09am

Check the sender's email address!

Dear Student,

Please be informed that your access to NTU Library System will expire soon. Your library enrollment "john1234" ~~is set~~ to expire on October 15, 2020 12:00, so this is a notification for you to renew now. To renew, simply click on the following link:

University Library

<https://tg.sv/yaawtg>
Click or tap to follow link

Verify the legitimacy of the link before clicking!

You will not be required to ~~provide any~~ identity information during this renewal process.

The above renewal link is only valid for a limited time. If you fail to renew your library enrollment before then, you will lose access to all library online services. For a list of the current library online services, please visit:

Urgent threatening language

<https://www.ntu.edu.sg/library/Pages/default.aspx12>

If you have any questions concerning your status or access to the library online services, please contact the Library Help Desk as soon as possible.

Sincerely,

NTU Library,
50 Nanyang Ave, Singapore 639798
Email: libraries@ntu.edu.sg

The real email address is library@ntu.edu.sg!

1. From the previous video, we learn that the acronym PASS for us to remember how we can practise good cyber hygiene. What does it stand for?

From the previous video, we learn that the acronym PASS can help us to remember how we can practise good cyber hygiene. What does it stand for?

Choose one of the following answers.

☐ Protect devices, Antivirus, Synchronize data, Software application

✓ ☒ Password, Antivirus, Spot signs of phishing, Software application

☐ Protect devices, Auto sign-in, Synchronize data, Security

☐ Password, Auto sign-in, Spot signs of phishing, Security

PASS stands for **P**assword, **A**ntivirus, **S**pot signs of phishing, and **S**oftware application. This serves as a reminder and provides practical tips for us to stay cyber safe.

Module 4 – Fake News

Falsehoods: A statement is false or misleading

Misinformation: The inadvertent dissemination of false information

Disinformation: The intentional dissemination of false information

Fake News:

A type of falsehood intentionally packaged to look like news to deceive others (intention, format, facticity)

Motives:

- Financial
 - o Attracting clicks
 - o Advertising Revenues
- Ideological
 - o Personal Agenda
 - o Weapons of Mass Misinformation
- Political satire
- News parody
- Propaganda
- Advertising
- Manipulation
- Fabrication

What makes people vulnerable?

- Sender
 - o Credible or familiar?
 - o Trustworthy or similar?
 - o Proximate or distal?
- Message
 - o Format
 - o Plausibility
- Channel
 - o Trusted or depended on?
 - o Closed or open?
 - o Feedback
- Receiver
 - o Confirmation bias
 - o Motivations
 - o Corrections
- Context
 - o Information overload

- Instability

Different Sources

- Original Source
- Immediate Source
- Invisible Source
- Trusted Source
- Disregarded Source

Message characteristics

- Plausible?
- Mentions Experts?
- Conversation Tone
- Stirs Emotions
- Asks for call to actions (Forwarding the message)?
- Channels where information flows
 - Popularity cues
 - Reliance
 - Lack of gatekeeping
 - Information overload
- Higher social media news use= Higher likelihood to believe in fake news
- Avoiding news = more likely to believe in misinformation
- Confirmation Bias: Information that aligns with our existing beliefs

Informational apathy (Why people ignore telling people they are wrong about news?)

- Issue Relevance: Does not concern me
- Interpersonal Relationships: Do not want to offend family/friends
- Personal Efficacy: There is no point in reasoning as people already believe

Consequences of fake news

- Short Term
 - Political Decisions
 - Business
 - Peace and Order
 - Reputation
- Long term
 - Devaluations of Information
 - Erosion of trust in institutions
 - Larger social divisions
 - Chilling Effect

What can we do?

1. Individuals Authentication

- Internal Acts of Authentication

- The **Self**: We are old enough to judge and think (experience)
- The **Source**: Is the source reliable
- The **Message**: Check the tone and see if its polemical or deliberately misleading to arouse emotions
- The **Message Cues**: If there are more likes , shares , comments
- **External Acts of Authentication**
 - **Incidental & Interpersonal**: By chance discussing with family or friends
 - **Incidental & Institutional**: Waiting for the follow-up news to confirm it
 - **Intentional & Interpersonal**: Asking a reliable group to verify
 - **Intentional & Institutional**: Googling the information to check
- Social process
 - Motivations for authenticating
 - **Self-image** (show that you don't have questionable beliefs)
 - **Group cohesion**
 - Strategies of authentication
 - Group beliefs; "deep stories"
 - Source affiliation - Sharing as authenticating
 - Consequences of authentication
 - **Institutionalisation of Interdependence**
 - **Ritualisation of collective authentication**

2. Governments Authentication

- **POFMA**:
An Act to prevent the electronic communication in Singapore of false statement of fact, to suppress support for and counteract the effects of such communication, to safeguard against the use of online accounts for such communication and for information manipulation, to enable measures to be taken to enhance transparency of online political advertisements, and for related matters.

3. Tech companies Authentication

- **Intervention** (pressure by the public)
 - Supporting third party fact checkers and journalists
 - Promoting media literacy among users
 - Reducing financial incentives for content producers
 - Implementing new features to flag content
 - Deleting post and removing accounts

4. Journalists and fact-checkers

- **Fact checking**
 - **Verification**: The process of evaluating the story before it becomes news
 - **Fact Checking**: The process that occurs post publications
- **Types of Fact Checkers**
 - Affiliated with news organisation
 - Government Owned
 - Independent Organization
 - Volunteer Groups

- Individual
- **Fact Checking Tools**
 - Monitor What's Trending
 - Verify Images
 - Verify Sites
 - Check the Weather
- **Fact Check Message**
 - Videos
 - Rating Scales – demonstrate T or F
 - Mixed Accuracy Statements
 - Truth Sandwich (Correction is presented first followed by debunking the falsehood and then reiterating the correction after) *Truth → lie → Truth*

What can we do?

1. Reflect on our own information behaviour.
2. Engage, rather than ignore.
3. Strive to understand others.
4. Use and support reliable and legitimate information sources.
5. Maximise available resources.
6. Equip ourselves.

LAMS questions

1. 1 What do we mean by “fake news?”

What do we mean by “fake news?”



Choose one of the following answers.

- ☐ The intentional dissemination of false information
- ☐ General term for false information online
- ☐ The inadvertent dissemination of false information
- ✓ ☒ A specific type of falsehood intentionally packaged to look like news to deceive others

Fake news is a type of disinformation that mimics the look and feel of real news to increase its deceptive power.

1. 2 What are the motivations for the creation of fake news?

What are the motivations for the creation of fake news?



Choose one of the following answers.

- ☐ Ideological
- ☐ Financial
- ✓ ☒ All of the above

Fake news creators are motivated by two main factors. First, some fake news creators seek to make money from digital advertising. By creating outrageous content, they increase traffic to their sites. Second, other actors create fake news to push for a certain political agenda, such as to discredit political rivals or sow chaos in a target country.

1. 3 Confirmation bias refers to

Confirmation bias refers to



Choose one of the following answers.

- ✓ ☒ Human tendency to seek and believe in information that confirms our existing beliefs
- ☐ Human tendency to believe a lie when it is repeated several times
- ☐ Some individuals have high confidence in their ability to spot fake news but actually have low capability
- ☐ All of the above

It is easier for us to process new information when it already aligns with our existing beliefs. This makes our lives simpler, but also makes us vulnerable to fake news.

2. 3 In a survey conducted in Singapore in December 2019, which type of news consumption was found to be positively related with belief in fake news?

In a survey conducted in Singapore in December 2019, which type of news consumption was found to be positively related with belief in fake news?



Choose one of the following answers.

- ☐ All types of news use
- ☐ Traditional news media use
- ✓ ☒ Social media news use

This survey, as well as previous studies in other countries, found that social media news use is positively linked to higher propensity to believe in fake news. Why do you think this is the case?

1. 4 Why do most people ignore false news on social media?

Why do most people ignore false news on social media?



Choose one of the following answers.

- ☐ The topic is not relevant to them
- ☐ They want to avoid arguments
- ☐ They don't want to hurt the feelings of those who posted the incorrect post
- ☐ They think that taking action won't have any impact

✓ ☒ All of the above

When people who are able to spot fake news do not do anything, they allow fake news to thrive. Some people post something on social media not because they believe in it, but sometimes it is because they are not sure and they hope someone can verify it for them.

2. 4 In surveys done in Singapore, what do most people do when they read false news on social media?

In surveys done in Singapore, what do most people do when they read false news on social media?



Choose one of the following answers.

- ☐ Report the post so it gets removed
- ☐ Comment on the post to say it is wrong
- ☐ Post a correction on their own account

✓ ☒ Ignore the post

Most participants said they ignore false news when they see one on social media. However, this form of informational apathy allows the spread of fake news.

1. 1 True or false: Authentication of information is a purely individual-level process.

True or false: Authentication of information is a purely individual-level process.



Answer:

✗ ☐ True

✓ ☒ False

Authentication can also be a social process. Some people post information online, hoping someone will authenticate for them. Others also turn to family or friends to authenticate information they are unsure about, which is a form of external authentication.

1. 2 Singapore's law to combat fake news, which was passed into law in May 2019, is called:

Singapore's law to combat fake news, which was passed into law in May 2019, is called:



Choose one of the following answers.

- ☐ Anti-Fake News Law
- ✓ ☒ Protection from Online Falsehoods and Manipulation Act
- ☐ Network Enforcement Act
- ☐ None of the above

POFMA was passed into law in May 2019 and empowers ministers to issue orders to individuals, internet providers, tech platforms, and mass media outlets to correct or take down posts that are deemed false and threaten public interest.

1. 3 Which process "occurs post publication and compares an explicit claim made publicly against trusted sources of facts?"

Which process "occurs post publication and compares an explicit claim made publicly against trusted sources of facts?"



Choose one of the following answers.

- ☐ Verification
- ✓ ☒ Fact-checking
- ☐ None of the above

Fact-checking is the process of authenticating information already in the public domain. Verification is a process that is done prior to publication.

2. 3 What is a "truth sandwich?"

What is a "truth sandwich?"



Choose one of the following answers.

- ☐ A format used by a fact-checking site where the number of sandwiches accompanying a post visually indicates the truthfulness of the post (i.e., having five truth sandwiches means the post is completely true).
- ☐ A viral fake news post saying a type of sandwich can make people immune to fake news.
- ✓ ☒ A fact-check format where correction is first presented, followed by the falsehood being debunked, and ending with the correction being stressed again.

To avoid primacy effects, which may cause a fact-check to backfire, some suggest that a fact-check should start with the correct information and not start by repeating the post being debunked (because some people will remember what they see first). The fact-check should also end with the correction being stressed or repeated, so as not to let recency effect kick in (i.e., some people may remember the last thing they read).