



0 • Exam Map

COURSE DATA · FAQ

ASSESSMENT	WEIGHT	FORMAT
Mid-Semester Quiz (Assessment 1)	20%	Individual online quiz, Week 7; Weeks 1-5
Web-Based Assignment 1 (Assessment 2)	15%	Individual web assignment, Week 6
Web-Based Assignment 2 (Assessment 3)	25%	Individual web assignment, Week 12
Final Exam (Assessment 4)	40%	Formal examination; exam review sets 40% minimum

PERMITTED MATERIALS · VERBATIM

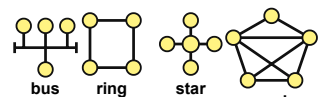
"What can I bring into the exam hall? Stationery. Non-programmable calculator. 1 A4 memory aid."

(SENG1050 Formal Examination FAQs)

Practice-paper shape: 120 min + 10 min reading; A: 10 MCQ/20 marks; B: 6 short answers/50; C: 3 long answers/30. Section C = **code writing + Huffman**.

1 • Networks & Addressing

W1-2



LAN shapes: star is cheap and manageable but its central switch is a single failure point; mesh trades cables for resilience.

SWITCHING	RULE / COST
Circuit	Dedicated reserved path; reliable, but wastes capacity.
Message	Whole message stored then forwarded; needs large buffers.
Virtual circuit	Packets share a pre-set route; setup first.
Datagram	Each packet independent; Internet method; loss/order handled above.

Routing chooses an end-to-end path and builds the table; **forwarding** uses header + table to move one arriving packet to an output. IP names/routes unreliably; TCP adds connection, ordering and reliability. Ports identify applications: HTTP 80, HTTPS 443.

https	shop	ex...com.au	catalog	file
proto	host	domain	folder	

URL anatomy:
<https://shop.example.com.au/catalogue/index.html>; use relative URLs within your own site.

IPv4 block → 8 bits using 128 64 32 16 8 4 2 1.
CIDR a.b.c.d/x: x leading bits identify network.
HTTP class: 1 info · 2 success · 3 redirect · 4 client · 5 server error.

2 • HTML Structure

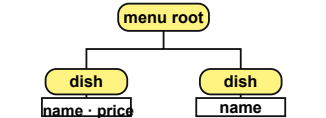
W2

MINIMAL VALID DOCUMENT	
<!DOCTYPE html> <html><head><meta charset="UTF-8"><title>...</title></head> <body></body></html>	
NEED	USE / RULE
Meaning	h1-h6, strong, em, lists; appearance belongs in CSS.
Link	; relative inside site, absolute outside; #id for fragment.
Image	src plus useful alt text; no end tag.
Reserved text	< for <; character references prevent parsing as markup.
Validation	Fix the first reported error, then validate again.

Head = metadata, title, encoding. **Body** = displayed content. An element is start tag + content + end tag; void elements have no content/end tag. Phrasing content cannot contain block content such as p.

3 • XML + DTD Method

W3 · STARRED



Read XML as one tree: exactly one root; element children are ordered; attributes attach to their element.

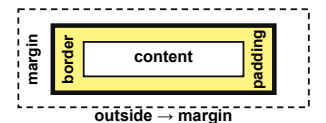
TEST	MUST HOLD
Well-formed	Declaration first; one root; close every element; proper nesting; quoted attributes; case matches.
Valid	Well-formed and conforms to its DTD: legal elements, order and attributes.
Text	PCDATA is parsed; CDATA leaves raw text alone; < and & otherwise need entities.

<!ELEMENT menu (dish+)>
<!ELEMENT dish (name,price?)>
<!ATTLIST dish type CDATA #IMPLIED>
none=exactly 1 · +=1+ · *=0+ · ?=0/1
, = sequence · | = choice

EXAM First classify **well-formed versus valid**; a syntactically correct tree may still violate the DTD.

4 • CSS Rule Selection

W4 · STARRED

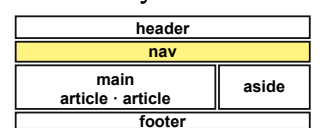


Box model inside→out: content, padding, border, margin. Default width names content only; border-box includes padding + border.

SELECTOR	MEANING
div p / div > p	Any descendant / direct child.

5 • Forms + Layout

W5



Semantic outline: one visible main; article stands alone; aside is tangential; header/footer may belong to page or section.

GET	POST
name=value pairs appended after ? in URL	Values in request body
Bookmark/share; searches and filters	Logins, payments, stored-data changes
Length-limited; never sensitive data	No practical size limit; still needs secure transport

Every control needs a **name**; it becomes the server key. Match label for to control id. Radios in one group share a name and allow one value; checkboxes allow several. Group with fieldset + legend. Form action = receiving program.

Table: caption → thead/tbody → tr → th/td.
colspan reduces cells in that row; rowspan occupies position in later rows.

LAYOUT	BEHAVIOUR
normal flow	Blocks stack; inline boxes run along a line.
relative	Offset; original gap remains.
absolute	Out of flow; nearest positioned ancestor.
fixed / sticky	Viewport-fixed / normal until threshold.
flex	Arranges children on row or column axis.

6 • Client-Server + PHP

W6



Three tiers separate presentation, processing and storage so each can scale and be secured independently.

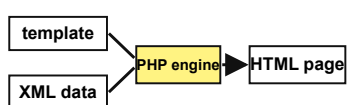
CLIENT-SERVER	PEER-TO-PEER
Central storage, trusted source, one place for rules/backup.	Each device is client and server; contributes resources.
Server may be failure point, target and bottleneck.	No central control; harder security/consistency.

Apache: document root publishes files; virtual hosts allow multiple sites. ServerSignature Off + ServerTokens Prod reduce leakage. Browser gets PHP **output**, not source.

\$qty=(int)\$_GET["qty"];
\$price=(float)\$_GET["price"];
\$total=\$qty*\$price;
echo "<p>\$total</p>";

7 • CMS + XPath

W7



Templating: shared layout + page-specific XML feed one PHP engine; change common navigation once.

CMA = authorised administrative back end that creates/edits content. **CDA** = public read-only front end that compiles/caches pages. Apply least privilege.

XPATH	SELECTS
/cinema/film	Absolute path from root.
//title	Every title at any depth.
film[1]	First film; XPath positions start at 1.
film[@rating]	Films having rating attribute.
film[@id="f1"]/title	Title of matched film.
* / @ *	Any element / attribute.

\$xml=simplexml_load_file("films.xml");
\$nodes=\$xml→xpath(' //film[@rating]');
foreach(\$nodes as \$film) echo \$film→title;

xpath() returns an array; use [0] for first node. **XPath counts from 1; PHP arrays from 0**. Attribute: \$film["rating"].

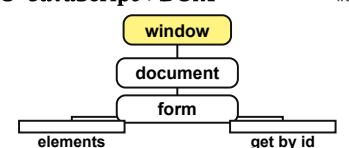
CSS CONFLICT CHECKPOINT

source priority → specificity IDs | classes+pseudo | elements → exact tie: **later rule wins**.

One ID outranks any number of classes. External CSS holds rules only. Link reset **before** your sheet. px = 1/96 inch; em follows parent; rem follows root.

8 • JavaScript + DOM

W8



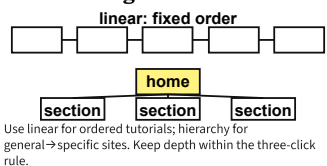
DOM access starts at document: through named forms/elements or directly through a unique id.

function checkQty(){
var q=document.getElementById("qty").value;
if(q==="")alert("Enter quantity");return false;
return true;}
<form onsubmit="return checkQty();">

CONTROL	READ / FAIL TEST
text	.value === ""
checkbox	.checked true/false
radio group	Loop; at least one checked
select	selectedIndex is 0-based

9 • Site Design + SEO

W9



DESIGN	APPLICATION
Repetition	Consistent elements/navigation.
Contrast	Attention + readable colour difference.
Proximity	Group related items.
Alignment	Create visual unity.
Accessibility	Perceivable, operable, understandable, robust.

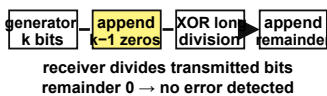
Speed: size/compress/lazy-load images; defer blocking JS; load essential CSS first. The lecture warns that pages over about three seconds lose roughly half their traffic. **Responsive:** flexible layout + media queries.

Structure: linear suits fixed sequences; augmented linear adds a return-to-start link; hierarchy suits categories. Avoid a hierarchy so deep that the three-click rule fails or so broad that menus exceed about four manageable chunks.

SEO: unique title, meta description, natural keywords, alt text, clear links and trusted inbound links. A sitemap helps large or new sites with few external links. Crawlers read markup/text. SEO = organic; paid listings = search marketing.

10 • Encoding + Compression

W10 · CERTAIN



CRC: generator width fixes appended zeros and remainder width; modulo-2 subtraction is XOR.

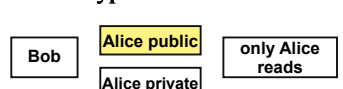
METHOD	RULE
Parity	Makes ones even/odd; can miss two flips.
CRC	Polynomial→bits; append k-1 zeros; XOR-divide.
Run length	Count+symbol for repeated runs.
Huffman	Merge two lowest; left 0/right 1; prefix-free.
Lossless/lossy	Exact reconstruction / discards detail.

original=characters×8
compressed=Σ(frequency×code length)
saving=1-compressed/original

Huffman ties may change codes, not total bits. State tie rule. ASCII = 7 bits; Unicode covers over a million characters; UTF-8 uses 8-bit units. Week 10 marks CRC + Huffman as certain exam content.

11 • Encryption Chooser

W11



encrypt public → decrypt private
Confidentiality uses the recipient's pair: encrypt with Alice's public key; decrypt with Alice's private key.

GOAL	METHOD
Confidentiality	Recipient public → recipient private.
Origin + integrity	Hash; sender private signs; sender public verifies.
Fast bulk data	Symmetric shared key.
Trust a key	Certificate authority signs identity+public key.

Goals: authentication, integrity, non-repudiation, confidentiality. TLS/PGP use asymmetric encryption to carry a random **session key**, then symmetric encryption for data. A certificate contains owner identity and public key, issuer, validity period, serial number and issuer signature.

RSA: primes p,q → n=pq → φ=(p-1)(q-1) → public e coprime with φ → private d: ed≡1 (mod φ).

Substitution preserves frequencies; transposition reorders; XOR flips bits. A counterfeit-key attacker substitutes a directory key; certificate signatures defend the binding. Always name **whose** key.

12 • Security, Privacy, Ethics

W12

1 recon	2 compromise	3 foothold
6 move	5 internal recon	4 privilege
7 persist	8 mission	9 erase traces

Nine stages: break the chain at any point with layered controls, least privilege, updates, authentication and monitoring.

PAIR	DISTINCTION
Virus / worm	Host file must run / spreads unaided.
Phishing / pharming	Deceives person / alters DNS mapping.
DoS	Floods service so real users cannot be served.
Opt-in / opt-out	Nothing until agreement / collected unless refused.

Cookies are text files, not executable, but permit tracking. Personally identifiable information identifies, locates or contacts a person. Informed consent follows full relevant disclosure. Ethics asks right/wrong; law is government-made rules—legal need not mean ethical.

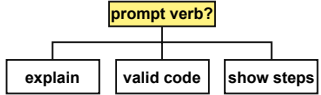
ANSWER Threat → attack stage → targeted layered defence → how it breaks that stage.



Full guide + ask Sia about SENG1050

13 · Final-Question Triage

REVIEW + PRACTICE



Triage by output; theory needs the deciding distinction; code needs valid syntax and flow; calculation needs every intermediate state.

PROMPT CLUE	WRITE THIS METHOD
Path / resource	Label URL; relative versus absolute.
XML correctness	Well-formed checklist, then DTD validity.
CSS conflict	Source → specificity ID/class/type → later tie.
Form sent	method→URL/body; name→key; cast server input.
Select XML	XPath path/predicate; 1-based positions.
Stop submit	Boolean JS + return false/true.
CRC	generator → zeros → XOR → remainder → check.
Huffman	counts → merges → codes → bits → saving/ratio.
Secret / signature	recipient public / sender private.
Incident	threat → cycle stage → defence.

LONG ANSWER *Allocate time by marks. Skeleton first; final pass for tags, braces, semicolons, names, branch labels and ratio direction.*

14 · HTTP + Web Stack Recall

W1-2 · W6

ITEM	EXAM SENTENCE
DNS	Maps memorable name to numeric IP.
HTTP	Browser requests; server returns status, headers, body.
SMTP	Sends email over TCP/IP using store-and-forward.
Web ≠ Internet	Web is one service using Internet infrastructure.
PHP ≠ JS	Server-side output / browser-side visible source.

GET /catalogue/index.html HTTP/1.1
Host: shop.example.com.au
2xx success · 3xx redirect · 4xx client · 5xx server

IPv4 drill: convert each decimal block separately into exactly eight bits. DNS drill: names help people; routers need numeric IP addresses.

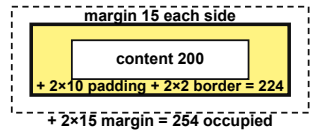
https	shop	ex...com.au	catalog	file
-------	------	-------------	---------	------

proto · host · domain · folder · file
From the same catalogue folder, the shortest link to this resource is href="index.html".

15 · Worked 1: CSS Box

CH4 WORKED EXAMPLE

Given: width 200px, padding 10px, border 2px, margin 15px.



Default content-box arithmetic adds two horizontal sides at every layer.

- Visible border box = 200 + 2×10 + 2×2 = **224px**.
- Occupied space = 224 + 2×15 = **254px**.
- With box-sizing: border-box, border box = 200px and content = 200 – 20 – 4 = **176px**.

TRAP *Margin never enters declared border-box width; it remains outside.*

16 · HTML + Form Build Order

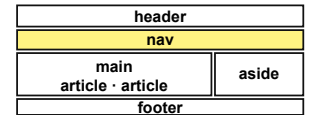
W2 · W5 · SECTION C



label→id · name→key · action→program
validate client + validate server
Submission chain: label/id aids use; name becomes key; method carries it; action chooses receiver.

- Doctype, html, head/title, body, one h1.
- Form action + method; labels/controls with matching for/id and name.
- Correct types; radios share name; submit control.
- One JS validation hook with return.
- Close non-void elements; validate generated HTML.

SEMANTIC CHOICE	DECIDING TEST
article	Could it be published independently?
aside	Is it tangential support?
nav	Is it a major navigation block?
main	Unique visible central content.



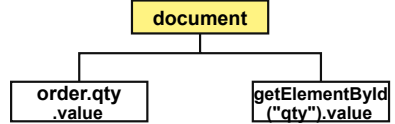
Outline before styling: regions convey role to readers, assistive technology and crawlers.

CONTROL	CRITICAL ATTRIBUTES
Text/number	type, id, name, value/range as needed.
Radio group	Same name, distinct values; only one selected.
Checkboxes	Several may be checked and share a name.
Select	option values; JavaScript selectedIndex is 0-based.

17 · Worked 2: DOM Read

CH8 WORKED EXAMPLE

Given: form named order, text box named and identified as qty.



Both routes begin at document; one follows named form objects, the other a unique id.

document.order.qty.value
document.getElementById("qty").value

Answer: both read the same value and start from document under window. The second route reaches any element with that unique id.

TRAP *getElementById is case-sensitive; final d is lower-case.*

18 · JavaScript Long Answer

PRACTICE PAPER

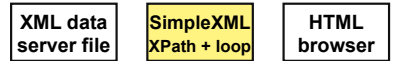
```
<script>function total(){var p=document.getElementById("price").value;var q=document.getElementById("quantity").value;if(p==="")||q===""){alert("Complete both fields");return false;}else{alert(Number(p)*Number(q));return true;}}</script>
```

CHECK	REASON
Valid page shell	Question asks for an HTML page.
Exact ids	DOM lookup is case-sensitive.
Numeric conversion	Form values begin as text; + may join.
false on failure	Prevents submit after alert.
clear names/comment	Reduces tracing mistakes.

Use either onSubmit="return total();" or button onclick, not both. Client validation can be bypassed.

19b · XML→PHP→HTML Drill

W7



load → select → foreach → echo

The browser receives generated HTML; the XML and PHP source remain on the server.

20 · Worked 3: CRC

CH10 WORKED EXAMPLE

Given: message 110101; generator $x^3 + 1 = 1001$.

```
110101 + 000 → 110101000
110101000
@ 1001
= 0100001000 → 000011000
→ 000001010 → 000000011
rem 011 · send 110101011
```

Modulo-2 division uses XOR, no carries or borrows; preserve leading zeros in the three-bit remainder.

- Generator has 4 bits; append 3 zeros: 110101000.
- XOR: 010001000 → 000011000 → 000001010 → 000000011.
- Remainder **011**; transmit **110101011**.
- Receiver divides by 1001 and gets **000**: no error detected.

SELF-CHECK *Remainder width $k-1 = 3$. Zero detects no error; it does not prove correctness.*

21 · Error/Compression Traps

W10

TRAP	CORRECTION
Append generator length zeros	Append one fewer .
Ordinary subtraction	Use XOR only.
Drop leading zeros	Keep width $k-1$.
Huffman prefix	No code begins another.
Saving=compressed/original	That is retained; saving=1-it.
Unlabelled ratio	State direction.

Parity: one flip changes parity; two can preserve it.

Run length: good for runs, poor for alternating data. Dictionary: replaces repeated phrases. Lossy media trades detail for size.

22 · CRC/Huffman Chooser

W10

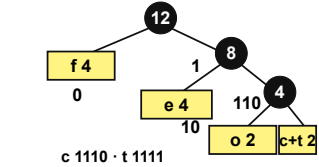
IF ASKED FOR...	FINISH WITH...
Error detection	Transmitted bits + receiver remainder.
Prefix tree	Codes and encoded message.
Space saved	Original bits, compressed bits, percentage.
Exact ratio	Simplified labelled original:compressed.

ENCODING / FORMAT	WHAT TO SAY
ASCII	7 bits, 128 values; uppercase/lowercase have distinct codes.
Unicode / UTF-8	Over a million characters; UTF-8 uses 8-bit units and keeps ASCII compatibility.

23 · Worked 4: Huffman

COURSE WORKED EXAMPLE

Encode: coffeetoffee (12 characters).



One valid tie-break: f0, e10, o110, c1110, t1111. Left=0, right=1.

- Counts: f4, e4, o2, c1, t1; total 12.
- Merge c+t→2; o+2→4; e+4→8; f+8→12.
- Codes: f0; e10; o110; c1110; t1111.
- Message: 1110110001010111110001010 = **26 bits**.
- Original 12×8=96. Saving 1–26/96=70/96≈**72.9%**. Original:compressed=96:26=**48:13**.

bit check = 4×1 + 4×2 + 2×3 + 1×4 + 1×4 = 26

TRAP *Ties may change codes, not total. Show merges so the tree is traceable.*

24 · Decode / Verify

W10

CHECK	EXPECTED
Frequencies/root	Both total 12.
Prefix	No code begins another.
Decode	Root per bit; emit at leaf; restart.
Bit total	Σ frequency×length = 26.
Percentage	Retained 27.1%; saving 72.9%.

BUILD + DECODE

STAGE	INVARIANT
Count	Every source symbol appears once in the frequency list.
Merge	Choose the two lowest available weights; insert their sum.
Label	Use one direction as 0 and the other as 1 throughout.
Code	Read root→leaf; frequent symbols normally have short paths.
Decode	Start at root, follow each bit, emit only on a leaf, restart.
Measure	Do not count the tree itself unless the question asks; use stated 8-bit original assumption.

Prefix-free: no code begins another, so symbol endings need no separators. A violation means the tree was read wrongly.

Ties: several valid trees may result. Record merge order; verify length by frequency×depth and direct bit count.

COMPRESSION IDEA	RECOGNITION RULE
Prefix code	No code is the start of another; separators are unnecessary.

25 · Worked 5: Key Choice

CH11 WORKED EXAMPLE

CONFIDENTIALITY
Bob: Alice public → Alice: Alice private

SIGNATURE
Alice private: sign → Alice public: verify

Name owner + key type; "the public key" is ambiguous.

- Only Alice reads Bob's contract: Bob encrypts with **Alice's public key**.
- Only Alice holds **Alice's private key**, so only she decrypts.
- Alice proves reply: hash, sign digest with **Alice's private key**.
- Bob verifies with **Alice's public key** and compares his digest: match supports origin + integrity.

Counterfeit key: attacker replaces a directory key, reads, re-encrypts with genuine key and forwards. A certificate authority signature binds identity to public key; verify chain and validity period.

26 · Attack/Defence Drill

W12 METHOD

study website	malicious file	install backdoor	gain admin
recon	breach	foothold	privilege

filter · MFA · least privilege · patch

Classify by attacker goal: learn → get in → stay in → gain power.

EVENT	STAGE + DEFENCE
Studies website	Recon; limit exposed technical detail.
Opens attachment	Compromise; filtering + awareness.
Backdoor installed	Foothold; patching + monitoring.
Admin rights gained	Privilege escalation; MFA + least privilege.

A virus copies into files and needs its host run; a worm spreads unaided. Phishing deceives a person; pharming alters DNS so a genuine address reaches a spoofed site. Not all malware is a virus.

Privacy: cookies are text, not code, but enable tracking. Opt-in requires agreement first; opt-out collects until refused.

27 · One-Minute Error Scan

ALL WEEKS

- Routing ≠ forwarding; Web ≠ Internet.
- XML valid includes DTD; HTML meaning before appearance.
- ID specificity before classes; margin outside width.
- GET visible in URL; POST not automatically encrypted.
- XPath starts 1; PHP array starts 0.
- JS + joins; PHP · joins; cast values.
- CRC width = generator bits – 1.