FOOD90008 Food Safety and Quality

THE UNIVERSITY OF MELBOURNE · FACULTY OF SCIENCE · GRADUATE COURSEWORK

Full guide + ask Sia about FOOD90008

SIDE 1/2 DECISIONS · EVIDENCE · CONTROL · REGULATION · HACCP — OPEN-BOOK EXAM SHEET — S2 2026 · mechanisms + pathways + key values

01 Exam map

COURSE / HANDBOOK

A 20%	Test 30%	Plan 15%	Exam 35%

TASK	FORMAT / TIMING
Assignment · 20%	1,000 words; approx. Week 5
Online test · 30%	One hour; Week 8
Food safety plan draft · 15%	1,000 words; Week 10
Open-book examination · 35%	Two hours; examination period

PERMITTED-MATERIALS TRUTH

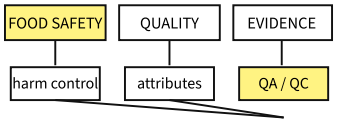
"Examination (open book) | 2 hours | During the examination period | 35%" *(University of Melbourne Handbook 2026, FOOD90008 assessment)*

★ **Exam value:** turn a process observation into a defensible decision: separate safety from quality, choose the evidence tool, trace authority, then justify control and response.

USE THE OPEN BOOK *for source navigation; it does not replace selecting the right tool or explaining its boundary.*

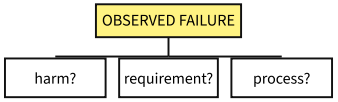
02 Safety ≠ quality

C1



Source figure redrawn: safety, quality and assurance lead to a system diagnosis.

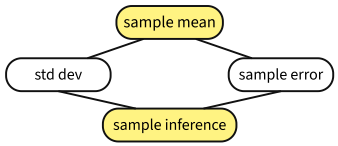
CONCEPT	WHAT IT DECIDES	DO NOT CLAIM
Food safety	Control of biological, chemical and physical hazards; unacceptable harm under intended use.	That every quality miss is unsafe.
Food quality	Attributes meeting requirements and consumer expectations beyond minimum safety.	That preference identifies cause.
Quality assurance	Process-oriented prevention and confidence in planned activities.	That end-product inspection alone assures the process.
Quality control	Output measurement or inspection against a requirement.	That detection prevents recurrence.



Source system-diagnosis figure redrawn as a failure classifier.

03 Sampling evidence

C2



Source figure redrawn: centre, spread and sampling jointly constrain interpretation.

SAMPLE MEAN

$\bar{x} = (1/n)\ \Sigma_{i=1}^{n}\ x_i$

n = valid observations included; $\bar{x}$ keeps x's unit. It estimates the centre of the observed sample, conditional on sampling and measurement quality.

EVIDENCE	ANSWERS	BOUNDARY
Mean	Where is the observed sample centred?	Not population truth by itself.
Standard deviation	How dispersed are observations around $\bar{x}$, in the same unit?	Not sampling bias.
Sampling error	How may the estimate differ because only part of the population was observed?	Not repaired by precise arithmetic.

INTERPRET IN FOUR MOVES

1. Define population, sampling frame, variable, unit and **n**.
2. Report $\bar{x}$ as sample centre and SD as within-sample spread.
3. Check representativeness, measurement quality and whether the process changed.
4. State what the sample can—and cannot—support about production.

TRAP *A small SD does not prove an unbiased sample, a sound measurement system or a stable process.*



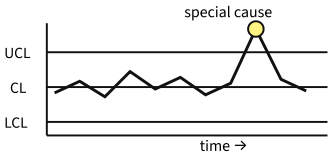
qualify the population inference

Source sample stress-test figure redrawn: arithmetic survives only if the evidence boundary does.

FAILURE MODE	WHAT CHANGES
Biased selection	The estimate may not represent the production population, even when calculated exactly.
Damaged measurement system	Centre and spread can describe measurement artefact rather than the process.
Changing process	A pooled mean and SD can mix process states. Preserve time order; if production changed, qualify the population inference instead of treating one summary as stable.

05 Stability before adjustment

C3



Source figure redrawn as the exam task: read the time order before changing the process.

GENERIC THREE-SIGMA SIGNAL FORM

UCL = μ + 3σ · LCL = μ - 3σ

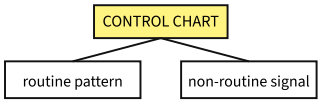
The appropriate chart, subgroup structure and estimator depend on the data-generating process.

PATTERN	MEANING	RESPONSE
Only routine fluctuation within a stable pattern	*Common-cause variation*: many influences in the current system.	Improve the system; do not chase each point.
Non-routine signal or changed behaviour	*Special-cause variation*: investigate before capability.	Locate assignable event/cause; restore stability.

READING SEQUENCE

1. Confirm time order, variable, unit, subgroup and chart choice.
2. Read centre line and statistically derived limits.
3. Look for non-random signals; state evidence, not just "out of control".
4. Classify likely common versus special cause and propose investigation.
5. Only after stability, compare process spread with specifications.

HARD BOUNDARY *Control limits describe observed process behaviour; specification limits state requirements. They are not interchangeable.*

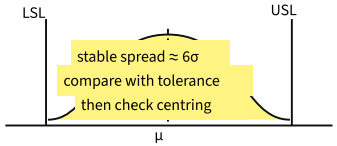


Source variation figure redrawn: the classification determines system improvement versus investigation.

Do not tamper: responding to every common-cause fluctuation as though it were special can increase variation. Conversely, averaging away a non-routine signal hides a changed process. The answer must name the observed pattern, causal class and proportionate response.

07 Capability is conditional

C4



Source capability figure redrawn: process spread sits inside externally set tolerances only under stated conditions.

POTENTIAL CAPABILITY

$C_p = (USL - LSL) / (6\sigma)$

Compares tolerance width with stable process spread. C_p ignores centring and measurement uncertainty.

OBJECT	COMES FROM	QUESTION
Control limits	Observed process behaviour	Is the process stable?
Specification limits	Product, customer or regulatory needs	What is acceptable?
Measurement uncertainty	Method/calibration under stated conditions	How much doubt attaches to the result?
Capability	Stable distribution vs tolerances	Does spread fit, and is centring considered?
Historical distribution	Past stable process under stated measurement conditions	Does not guarantee every future item.
Safety protection	Specification rationale	C_p cannot show that limits protect safety.

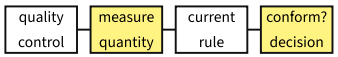
CAPABILITY DECISION CHAIN

Stability evidence → valid measurement → define USL/LSL → estimate σ → compute C_p → inspect centring → qualify conclusion. A capable historical distribution does not guarantee every future item or prove specifications protect safety.

WHICH IS TRUE? *"C_p compares widths" is true. "C_p proves every item conforms" and "C_p proves a safe specification" are false.*

08 Quantity conformance

C5



Source quantity figure redrawn: an average or one deviation never substitutes for the applicable rule.

SIGNED QUANTITY DEVIATION

$d_i = x_i - Q_n$

Keep the mass/volume unit; negative = under nominal, positive = over nominal. Legal conformance needs the complete current sampling and tolerance rule.

09 Labels + audit logic

C5

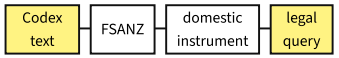
EVIDENCE	VALID USE	INVALID LEAP
Individual d_i	Direction and magnitude versus nominal quantity.	One package proves legal conformance.
Sample mean $\bar{x}$	Observed sample centre.	Average alone establishes compliance.
Sampling plan	Defines observations, selection and denominator.	Unstated frame is representative.
Regulatory standard	Supplies operative requirement through authorised jurisdiction/instrument.	A summary or international text is automatically domestic law.

Audit answer: define nominal claim and unit → describe sample and measurement method → calculate deviation/mean as appropriate → identify the current legal measurement framework → apply the complete rule → state decision and uncertainty.

ONE THING *Label compliance cannot be inferred from an average alone.*

10 Regulatory route

C6



inform / consider ≠ self-executing law

Source regulatory figure redrawn: trace authority rather than collapsing international guidance into domestic law.

LAYER	ROLE IN AN ANSWER
Codex Alimentarius	International standards, guidelines and codes; consumer-protection/governance context.
FSANZ	Statutory body developing and maintaining the Australia New Zealand Food Standards Code.
Regulatory standard	Legally operative requirement found through the authorised jurisdiction and current instrument.

WEIGHTED AUDIT SCORE

$S = \Sigma_{j=1}^{k}\ w_j c_j$

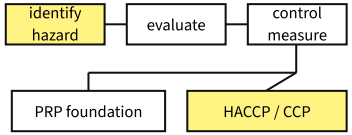
Use only after citing applicable provisions and defining criteria/weights. A score organises evidence; it does not create legal authority.

NAVIGATION METHOD

1. Frame the exact product/process/legal question.
2. Identify Codex material as an international reference.
3. Trace how FSANZ and the authorised domestic system address it.

11 Hazard analysis → control

C7



Source hazard-control map redrawn: foundation controls and product-specific critical control have distinct jobs.

Hazard analysis systematically identifies and evaluates potential hazards to decide which require control.

Prerequisite programs establish basic environmental and operational conditions. ***HACCP*** links significant hazards to critical controls, monitoring, corrective action, verification and records.

RISK-RANKING AID

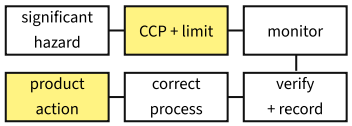
R = L × S

Define likelihood and severity categories and document the decision threshold. An ordinal product prioritises hazards within that scheme; it is not automatically probability or expected loss.

TRUE	FALSE SHORTCUT
Significance and control measure must be justified.	A hazard list is already a HACCP plan.
Prerequisite conditions support hygienic production.	Every prerequisite control is a CCP.
The lecture sequence uses five preliminary steps then seven principles.	The principles are a detached memorisation list.

12 CCP + limit + monitoring

C8–C9



deviation response:
contain → restore → verify

Source CCP and deviation-response figures combined at print scale.

LINK	MINIMUM DEFENSIBLE CONTENT
CCP	Why control here is essential; can a later step control the hazard?
Critical limit	Validated measurable accept/reject boundary.
Monitoring	Who, what, how, when and record; timely enough to act.
Corrective action	Product disposition + restore control + address cause.
Verification	Design valid and operating as planned over time.
Records	Result, deviation, action, review and closure.

FOOD90008 Exam drills · traps · applications

FOOD SAFETY AND QUALITY · THE UNIVERSITY OF MELBOURNE · SEMESTER 2, 2026

Full guide + ask Sia about FOOD90008

SIDE 2/2 · WHICH-IS-TRUE · SHORT ANSWERS · WORKED APPLICATIONS · FAST RECALL · OPEN-BOOK EXAM SHEET · Define → select → apply → qualify

13 Which is true? I C1–C4

WHAT DOES THE CLAIM REQUIRE?

harm control	sample summary	process stability	fit to tolerance
safety	$\bar{x}$ + SD	chart	C_p

then state the evidence boundary

New retrieval figure: classify the question before reaching for a formula.

STEM	TRUE	TEMPTING FALSE STATEMENT
Safety / quality	A quality failure need not be a safety failure.	All nonconformance creates unacceptable harm.
Rate	Nonconformance rate needs defect rule, denominator and frame.	The percentage identifies the process cause.
Mean	$\bar{x}$ describes the observed sample centre.	Precise $\bar{x}$ repairs biased selection or measurement.
SD	SD describes dispersion in the measurement unit.	Small SD proves representativeness.
Control limits	They reflect observed process behaviour.	They are product specifications.
Special cause	Investigate before making capability claims.	Adjust every point in routine variation.
C_p	Compares specification width with 6σ for a stable process.	Accounts for centring and uncertainty.

MCQ ELIMINATION VERBS

Reject options that **collapse** safety into quality, **infer cause** from a rate, **equate** control with specification limits, **claim certainty** from one sample, or **declare capability** before stability and measurement checks.

14 Formula selector C1–C10

IF ASKED FOR…	START WITH	MANDATORY QUALIFIER
Observed centre	$\bar{x} = \Sigma x_i / n$	Sample + measurement quality.
Potential fit	$C_p = (USL-LSL)/(6\sigma)$	Stable; centring/uncertainty excluded.
Quantity deviation	$d_i = x_i - Q_n$	Full current legal rule.

CONTROL CHART time behaviour · CAPABILITY spread vs limits

stability + valid measurement first then C_p; inspect centring

Source capability figure redrawn: chart evidence is an input to capability, not a substitute for it.

15 Which is true? II C5–C9

DEFENSIBLE	SHORTCUT
operative text	guidance = law
significant + CCP	hazard list = plan
monitor ≠ verify	same activity

New comparison figure: the exam-ready statement carries authority, system links and timing.

TOPIC	WHICH IS TRUE?	WHY THE OTHER FAILS
Quantity	Signed deviation retains unit and direction.	One d_i cannot establish legal conformance.
Codex	Codex informs food governance.	Domestic effect depends on authorised adoption.
Audit score	Weights can organise documented evidence.	Weights cannot create legal authority.
Risk rank	L×S prioritises within defined categories/threshold.	Ordinal product is not automatically probability.
CCP	Control must be essential for a significant hazard.	An "important" step is not automatically a CCP.
Limit	Measurable, validated acceptable/unacceptable boundary.	A vague target cannot anchor monitoring.
Monitoring	Detects status/deviation in time to act.	It is not later verification.
Compliance %	Uses completed in-scope checks as denominator.	High average cannot erase one unsafe excursion.
Verification	Tests validity and operation over time.	Exception frequency alone establishes severity.

FAST DENOMINATOR CHECKS

```
r: inspected items · M: completed in-scope monitoring checks · e: records actually reviewed. Define inclusion before dividing.
```

16 Correct pairings GLOSSARY

QA	process-oriented prevention	QC	output-oriented detection

hazard list · significance · control

PRP foundation · CCP if essential

justify the system link

Source hazard-control figure redrawn: significance and essentiality turn a list into a decision.

17 Short-answer engine C10

DECISION IN THE FIRST LINE

define object · select tool · show work · link facts · qualify claim

answer the exact food decision

Source integration figure redrawn as a five-part answer sequence.

UNIVERSAL FRAME

1. **Decision:** "The issue is [safety / quality / stability / capability / conformance / CCP status]."
2. **Definitions:** define the operative objects and denominators before calculating.
3. **Tool:** select formula, chart, regulatory provision or HACCP link; say why it fits.
4. **Application:** connect each fact to the method; preserve unit, time order, sign and authority.
5. **Conclusion + boundary:** state the decision, uncertainty and what the evidence cannot prove.

QUESTION VERB	REQUIRED MOVE
Distinguish	Define both; state decision consequence.
Calculate	Formula → substitution/symbol mapping → unit → interpretation → check.
Assess stability	Time order → limits/signals → cause class → action.
Audit conformance	Measure → rule/authority → apply → uncertainty.
Design control	Hazard → control → limit → monitor → deviation response → verify/record.

SENTENCE STEMS

Evidence: "The observed ___ supports ___ because ___." **Alternative:** "A similar pattern could arise from ___; measure ___ to discriminate." **Boundary:** "This supports ___ within ___, but does not establish ___."

MARKER-FACING *Put the decision and the link between evidence and control in view; a fluent list of terms is not an applied answer.*

SELF-CHECK BEFORE MOVING ON

VISIBLE?	QUESTION
Object	Did I define the hazard, sample, process or control at issue?
Link	Why does this evidence change the decision?
Comparator	Did I name the baseline, limit, source or alternative?
Boundary	What sampling, measurement, authority or system evidence remains?

19 Application A · heating CCP COURSE WORKED EXAMPLE

Scenario [5]: a chilled-food process has a validated heating step for a significant biological hazard. Build the CCP decision and monitoring plan.

bio hazard · validated heating · later step reliable? · CCP decision

validated limit · monitor + record · deviation action

product • process • verification

all three after deviation

Source CCP figure applied to the guide's chilled-food heating scenario.

1. Name the significant biological hazard and the preventive purpose of heating. **[1]**
2. Explain whether a later step can reliably eliminate or reduce it. **[1]**
3. State a measurable *validated* critical limit; do not invent a course-specific value. **[1]**
4. Specify who monitors what, when, how and where recorded. **[1]**
5. Separate affected-product control, process correction and later verification. **[1]**

Conclusion: CCP status is defensible only when hazard significance, uniqueness/essentiality of the control step and a validated measurable boundary are explicit.

MUST BE EXPLICIT	WHY
Significant hazard + no reliable later control	Establishes the basis and essentiality of this CCP.
Validated limit + who/what/when/how/record	Creates a measurable boundary and timely detection.

20 Application B · chart → C pC3–C4 WORKED

chart + signals · stable? measure? · C_p + centring

specifications are not control limits

Source capability route redrawn: stop if special-cause behaviour undermines σ.

Answer: describe chart/subgroup; assess stability; investigate non-routine signals; validate measurement; identify USL/LSL; then use $\mathbf{C_p = (USL-LSL)/(6\sigma)}$. Interpret as potential spread fit: C_p ignores centring and measurement uncertainty.

FAILURE MODE *Computing C_p first turns an unstable historical spread into false precision.*

21 Application C · quantity claim C2 / C5 WORKED

x_i + unit · $d_i = x_i - Q_n$ · $\bar{x}$ + spread

current legal rule · conformance

average alone is insufficient

Source quantity route applied as an auditable answer chain.

Task: decide whether a packaged-food quantity claim is supported. **Working:** define x_i, Q_n, unit, valid observations and sampling frame; calculate signed d_i and, where relevant, $\bar{x}$; describe spread and measurement quality; identify the current authorised measurement framework and apply its complete sampling/tolerance rule.

RESULT	INTERPRETATION CARRIED TO THE END
$d_i < 0$	Measured item is below nominal by $\lvert d_i \rvert$ in the original unit; legal conclusion still awaits the applicable rule.
$d_i > 0$	Measured item is above nominal by d_i; this alone does not validate the full quantity claim.
$\bar{x}$ reported	Centre of observed valid sample; representativeness and rule remain explicit.

FINISH *State the evidence-supported conformance finding, then name measurement and sampling uncertainty. Never stop at the arithmetic.*

APPLICATION CHECKLIST

CARRY THROUGH	DO NOT DROP
Every x_i and d_i	Mass/volume unit and sign.
Sample summary	Valid n, selection frame and measurement quality.
Conformance finding	Applicable sampling/tolerance rule and its authority.

22 Application D · regulatory claim C6 WORKED

question · Codex context · FSANZ route

operative text · apply + qualify

score organises ≠ authority

Source regulatory route redrawn as a compact application.

Answer: frame product/process and jurisdiction; identify Codex as an international source; trace FSANZ and the authorised domestic system; cite the current operative text before applying facts; separate legal conclusion from guidance. If using $\mathbf{S = \Sigma w_j c_j}$, define every criterion and weight; the score has no independent authority.

23 Deviation response drill C8–C9 WORKED

MONITORING DEVIATION

control product · restore process · address cause

verify + record + close

Source deviation-response figure redrawn: three immediate branches converge on evidence of closure.

PROMPT: ONE CRITICAL-LIMIT EXCURSION

1. **Detect:** cite result, limit, time and record.
2. **Contain:** identify/hold affected product; an average cannot erase the excursion.
3. **Correct:** restore process and address cause.
4. **Verify:** test design and operation; examine severity/recurrence.
5. **Record:** link result, disposition, cause, action and closure.

RATE INTERPRETATION

```
M = within-limit checks / completed in-scope checks × 100%
e = exceptions / records reviewed
Carry the denominator to the conclusion; frequency scopes follow-up, while severity and recurrence determine systemic meaning.
```

DISTINCTION *Monitoring asks "are we within the critical limit now?" Verification asks "is the designed system valid and operating as planned over time?"*

24 Integrated food decision C10

food-safety / quality decision

statistical + measurement evidence

regulatory + HACCP route

action

Source integration funnel redrawn: each layer narrows the claim into a traceable action.

Answer order: classify safety/quality → define process and evidence boundary → select summary/chart/capability tool → identify operative requirement → map hazard/control/limit/monitoring → specify deviation response, verification and records → conclude with uncertainty.

25 Thirty-second recall ALL

TRIGGER	SAY THIS FIRST
Safety?	Hazard + unacceptable harm + intended use.
Quality?	Requirement/consumer attribute beyond minimum safety.