

COMM1110

Evidence-Based Problem Solving

Complete Course Notes

UNSW Business School | Weeks 1, 2, 3, 4, 5, 7, 8, 9, 10

Course Overview

What is COMM1110?

COMM1110 Evidence-Based Problem Solving is a core first-year course in the UNSW Bachelor of Commerce. It equips students with a structured framework and a toolkit of analytical, statistical and ethical tools to address complex, real-world business and social problems. The course integrates critical thinking, information skills and statistical reasoning, applying them iteratively to cases across the semester.

The central aim of the course is to develop 'good problem solvers' who have a toolkit that helps them work efficiently -- starting with heuristics and rules of thumb to understand the direction and magnitudes of relationships that allows them to focus attention on the most important issues.

Course Structure

The course is organised around three stages of the Bullet-Proof Problem Solving (BPPS) framework:

1. Scoping: define the problem and disaggregate it into manageable components (Weeks 1 to 3).
2. Analysing: prioritise, build a work plan, and conduct rigorous analysis (Weeks 4 to 8).
3. Deciding: synthesise evidence and communicate conclusions (Weeks 9 to 10).

Week	Topic	Key Tools
1	Problems and Evidence-Based Problem Solving	Bounded rationality; cognitive biases; BPPS 7-step framework; types of evidence.

Week	Topic	Key Tools
2	Problem Articulation and Disaggregation	Logic trees; MECE; descriptive statistics; frequency distributions; histograms; mean, median, variance, correlation.
3	Frameworks for Ethical Decision Making	Ethics frameworks: consequentialism, utilitarianism, deontology, care ethics, virtue ethics; 7-step ethical decision process.
4	Understanding Problems: Fact Gathering	Data vs evidence; multiple/rigorous evidence sources; heuristics; scatter plots; correlation; regression; confoundment; experiments.
5	Patterns, Biases and Hypothesising Effects	Thematic analysis; probability; Bayes' rule; Type I/II errors; statistical biases; normal distribution; z-scores.
7	Analysing the Issues: Identifying Causes	Root cause analysis; fishbone diagrams; research designs; sampling distributions; Central Limit Theorem; confidence intervals.
8	Analysing the Issues: With Limited Evidence	Limitations of evidence; internal/external validity; hypothesis testing; t-test; statistical vs economic significance.
9	Problem Solving and Making Decisions	Logic trees revisited; brainstorming/brainwriting; communicating statistical results; guiding principles for empirical work.
10	Evaluation and Communication (Summary)	Full toolkit integration; common pitfalls; communicating uncertainty; replication and reproduction.

Assessment Overview

Assessment	Weight	Due Date
Excel Training Program Part A (Associate Level)	10%	4pm Friday, Week 4
Excel Training Program Part B (Expert Level)	10%	4pm Friday, Week 8
Case: Briefing Pack (Part A)	25%	4pm Friday, Week 5
Case: Business Report (Part B)	40%	4pm Friday, Week 11
Online Discussion Questions	15%	11:59pm Sundays from Week 1

Week 1 -- Problems and Evidence-Based Problem Solving

Week 1 establishes the philosophical and methodological foundation for the course. It introduces the nature of problem solving, why human beings are not perfectly rational decision-makers, what evidence-based problem solving (EBPS) means, and the 7-step Bullet-Proof Problem Solving (BPPS) framework that organises the entire course.

1.1 What is Problem Solving?

Problem solving is a goal-directed sequence of cognitive operations aimed at reducing the gap between a current state and a desired goal state. A well-structured problem has clearly defined goals, starting states, actions and constraints. Most business and social problems are ill-structured: goals are unclear, information is incomplete, solutions are multiple and uncertain, and significant judgment is required. This course is primarily concerned with ill-structured problems.

1.2 Rational Problem Solving

Classical economic theory assumes rational problem solving: the decision-maker has full and perfect information; measurable criteria exist; the individual has the cognitive ability, time and resources to evaluate every alternative. In practice, these assumptions rarely hold.

1.3 Bounded Rationality

Bounded rationality (Herbert Simon) refers to the reality that our ability to be fully rational problem solvers is constrained by numerous factors. Common constraints include:

Complexity	Problems are inherently complex and difficult to fully understand.
Time and Money Constraints	Not enough time or resources to gather all potentially relevant information.
Cognitive Capacity, Values and Habits	People have varying abilities, unconscious reflexes and accumulated biases that shape how they process information.
Imperfect Information	Available information is fragmented, incomplete or delayed.
Information Overload	So much data exists that it becomes impossible to process all of it before a decision must be made.
Different Priorities	Some data is perceived as more important, causing certain facts to be given too much or too little weight.

1.4 Cognitive Biases

Cognitive biases are systematic patterns in how people process information. They are mental shortcuts that allow humans to navigate the volume of information involved in decision-making, but they can lead to poor judgments.

Bias	Description	Business Implication
Framing Bias	Tendency to be influenced by how a problem or situation is presented rather than by its substance.	Changing how options are described can change the decision, even when the underlying facts are identical.
Availability Bias	Using only the information readily available when solving a problem, rather than seeking additional evidence.	Recent or memorable events are overweighted; less salient but equally important evidence is ignored.
Confirmation Bias	Seeking and favouring information that supports an existing point of view while discounting contradictory evidence.	Teams can lock onto a hypothesis and only look for evidence that confirms it.
Representative Bias	Generalising from a small sample or single event to a much larger population.	Drawing broad conclusions from a single customer complaint or one quarter of data.
Anchoring and Adjustment Bias	Initial information (the anchor) exerts disproportionate influence on all subsequent decisions.	First price proposed in a negotiation strongly influences the final settlement, regardless of underlying value.

1.5 Personal Decision-Making Styles

People also differ in their decision-making styles, which affects how they approach problems:

- Satisficers: choose between alternatives until an acceptable threshold is met. They stop searching once a good enough option is found.
- Maximisers: aim to make the choice that will give the maximum possible benefit. They continue searching until confident they have the best available option.

Neither style is inherently superior. Maximising is costly in time and cognitive effort; satisficing can miss significantly better options. Good problem solvers recognise their default style and adapt it to the stakes of the decision.

1.6 What is Evidence-Based Problem Solving?

Evidence-based problem solving (EBPS) is an approach to decision-making that:

- Uses structured frameworks to define and work through problems systematically.

- Integrates and applies multiple sources of evidence rather than relying on intuition or a single data point.
- Is particularly important when problems are uncertain, complex and high-stakes.

EBPS helps overcome bounded rationality, cognitive biases and information overload. It avoids fads, quick fixes and misinformation. It makes more informed decisions possible in contexts where certainty is unavailable.

Common misconceptions about evidence-based practice:

- 'Professional experience is ignored' -- false: practitioner expertise is one important source of evidence.
- 'It is all about numbers and statistics' -- false: qualitative evidence, stakeholder perspectives and expert judgment are equally valid sources.
- 'There is no time to collect so much evidence' -- false: good EBPS prioritises the most impactful evidence efficiently.
- 'Good evidence gives you clear answers' -- false: evidence reduces uncertainty but rarely eliminates it. Decisions under uncertainty remain necessary.

1.7 What is Evidence?

Data and evidence are not the same thing:

- Data is raw information -- a number or an observation. On its own it has no context or real meaning.
- Evidence is when data is used for or against an argument, hypothesis or opinion. Evidence always exists in relation to a claim. The same data can be evidence for or against different arguments depending on the context.
- Data becomes evidence when context is provided. More evidence, or different types of evidence, can change the argument.

1.8 Sources of Evidence

Good EBPS draws on multiple types of evidence simultaneously. No single source is sufficient on its own:

Scientific Literature	Peer-reviewed academic articles, systematic reviews and meta-analyses published in reputable journals. This is typically the most methodologically rigorous source. Builds on prior knowledge and prior experiences.
Organisational Data	Sales figures, costs, budgets, employee performance data, customer records. Rich in specificity but may have sampling or measurement issues.
Stakeholder Perspectives	Views, perceptions and experiences of those affected by the problem. Captures priorities and concerns that quantitative data misses. Needs to be gathered systematically to avoid hallway-conversation bias.
Professional Expertise	Expert opinions, interviews, focus groups, valuation reports. Valuable for domain knowledge but can be subject to advocacy bias if experts have a stake in the outcome.
Big Data and Analytics	Large-scale datasets, predictive modelling, correlations. Powerful but requires careful handling of biases including survivorship bias and algorithmic bias.