



Government of **Western Australia**
School Curriculum and Standards Authority

SAMPLE COURSE OUTLINE

MARINE AND MARITIME STUDIES
ATAR YEAR 11

Acknowledgement of Country

Kaya. The School Curriculum and Standards Authority (the Authority) acknowledges that our offices are on Whadjuk Noongar boodjar and that we deliver our services on the country of many traditional custodians and language groups throughout Western Australia. The Authority acknowledges the traditional custodians throughout Western Australia and their continuing connection to land, waters and community. We offer our respect to Elders past and present.

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Any resources such as texts, websites and so on that may be referred to in this document are provided as examples of resources that teachers can use to support their learning programs. Their inclusion does not imply that they are mandatory or that they are the only resources relevant to the course. Teachers must exercise their professional judgement as to the appropriateness of any they may wish to use.

Sample course outline

Marine and Maritime Studies – ATAR Year 11

Unit 1

Science Inquiry Skills

Science Inquiry Skills align with the Science Understanding and Science as a Human Endeavour content of the unit and are integrated into the learning experiences.

- identify, research and construct questions for investigation; propose hypotheses; and predict possible outcomes
- design investigations, including the procedure/s to be followed, the materials required, and the type and amount of primary and/or secondary data to be collected; conduct risk assessments; and consider research ethics, including animal ethics
- conduct investigations using ecosystem surveying techniques, including line transects, safely, competently and methodically for the collection of valid and reliable data
- represent data in meaningful and useful ways; organise and analyse data to identify trends, patterns and relationships; qualitatively describe sources of measurement error, and uncertainty and limitations in data; and select, synthesise and use evidence to make and justify conclusions
- interpret a range of scientific and media texts, and evaluate processes, claims and conclusions by considering the quality of available evidence; and use reasoning to construct scientific arguments
- select, construct and use appropriate representations, including classification keys, to communicate conceptual understanding, solve problems and make predictions
- communicate to specific audiences and for specific purposes, using appropriate language, nomenclature, genres and modes, including scientific reports

Semester 1

Week	Key teaching points
1–3	<p>Structure of the syllabus</p> <ul style="list-style-type: none"> • Course outline • Assessment outline <p>Marine: Oceanography</p> <ul style="list-style-type: none"> • properties and characteristics of seawater: salinity, solvent properties, heat capacity, density, viscosity, buoyancy, water pressure, light, displacement (including plimsoll line), effect on light, velocity of sound, and dissolved gases • location and characteristics of Western Australian marine ecosystems, including: <ul style="list-style-type: none"> ▪ seagrass meadows ▪ reefs ▪ deep seas (> 400 m) ▪ estuaries ▪ mangroves • classification and identification of species relevant to the Western Australian marine ecosystems studied • construction and use of simple apparatus to measure abiotic factors of a marine ecosystem • methods of measuring biotic factors: transects and quadrats <p>Task 1: Investigation – Testing for salinity</p>
4–5	<p>Marine: Environmental and resource management</p> <ul style="list-style-type: none"> • the use of the Western Australian marine environment to obtain salt, seawater, petroleum and gas: extraction processes, location, general impacts and economic value • decisions about whether to and how to extract a resource depend on the value, location and volume of the resource. Consultation and negotiation with local and Indigenous communities is required to further assess impacts on, and costs to, the marine environment and the community of removing the resource (Science as a Human Endeavour) • Australian Exclusive Economic Zone (AEEZ): description and location • human activities may contribute to habitat disturbance within ecosystems. Techniques, including transects and video surveying, in conjunction with measurement of abiotic factors, can be used so that a complete picture of the health of an ecosystem and its resilience to change may be obtained (Science as a Human Endeavour)
6–7	<p>Maritime: Design</p> <ul style="list-style-type: none"> • common craft design features, including: <ul style="list-style-type: none"> ▪ efficiency ▪ comfort ▪ safety ▪ cost effectiveness • design features of specific hull designs, including: <ul style="list-style-type: none"> ▪ hard chine ▪ catamaran ▪ trimaran ▪ hydrofoil ▪ small-water-plane-area twin hull (SWATH) ▪ wave piercer <p>Task 2: Test – Oceanography and Environmental and resource management</p> <p>Task 3: Investigation – Boat hull design</p>

Week	Key teaching points
8–9	<p>Maritime: History and archaeology</p> <ul style="list-style-type: none"> • impact of world trade patterns and historic sea routes, including the Brouwer route, on Western Australian coastal exploration • impact of technological advances on navigation and the subsequent consequences for exploration of the Western Australian coastline (Science as a Human Endeavour) • importance of exploration and mapping of the Western Australian coastline, including that carried out by de Vlamingh and Hartog
10–11	<p>Nautical concepts and skills: Power boating</p> <p>Trip planning</p> <ul style="list-style-type: none"> • boat preparation: safety equipment check, ramp etiquette, launch and recovery of a vessel • components of weather: temperature, rainfall, wind, clouds, seas and swell, storms and cyclones • marine weather forecasts, including Bureau of Meteorology and other models • weather map and forecast interpretation: local weather effects, wind against tide or current, wind strength/frontal squalls • log on, log off • charts symbols, chart types, scale chart work in local waters and local boating guides <p>Task 4: Test – Maritime history and archaeology</p>
12–15	<p>Nautical concepts and skills: Power boating</p> <p>Rules and regulations</p> <ul style="list-style-type: none"> • skipper’s responsibilities and duty of care: new crew induction, sinking, breakdown, fire, grounding, health-related problems, man overboard, search for and rescue of a man overboard, collision, capsize, abandon ship, grab bags, survival in water, passengers’/crew’s duties, code of conduct, reporting of accidents and rules • registration of vessels • port authority, licensing, recognition of operational areas and commercial regulations, including certificates of operation and certificates of competency <p>Safety equipment</p> <ul style="list-style-type: none"> • required safety equipment (including unprotected waters, protected waters, and registrable vessels and non-registrable vessels): lifejacket, visual distress signals (flares, electronic visual distress signal [EVDs], parachute flares), GPS-enabled Emergency Positioning Indicator Radio Beacon (EPIRB)/GPS-enabled Personal Locator Beacon (PLB), and marine radio (VHF, 27 MHz) • safety equipment expiry dates, care and maintenance, stowage and accessibility, safety equipment transition period (period of time to phase out old safety equipment) • recommended safety equipment (including unprotected waters, protected waters, and registrable vessels and non-registrable vessels): bailer or bilge pump, fire extinguishers, anchors • additional safety equipment: tool kit, first aid kit, fire blanket, life buoy, torch, life raft, replacement spark plugs, chart, knife, mask and snorkel, clothing, extra lines (ropes), sunscreen, water and extra fuel • distress signals: radio (mayday, pan-pan, securite), emergency positioning indicator radio beacon (EPIRB), flares and phone <p>Emergency situations</p> <ul style="list-style-type: none"> • safety briefing: first aid, seasickness, sunburn, safety equipment, code of behaviour, alcohol, movement about vessel, emergency signalling and fitting a life jacket • fire causes: engine, LPG, bilge and engine room cleanliness and refuelling • satellite technologies enable the accurate estimation of position fixing, allowing faster response in emergency situations on a global scale (Science as a Human Endeavour)

Week	Key teaching points
	<p>Collision avoidance</p> <ul style="list-style-type: none">• IALA Buoyage (System A): lateral, cardinal, special, isolated danger, safe water, wreck, marine safety signs and leads (sector light)• rules and regulations for preventing collisions within navigable waters <p>Maintenance</p> <ul style="list-style-type: none">• routine checks: electrical, fuel, cooling system, oil and propellers <p>Task 5: Practical – Deliver a new crew induction briefing</p> <p>Task 6: Practical – Power boating skills test</p>
16	Task 7: Examination

Unit 2

Science Inquiry Skills

Science Inquiry Skills align with the Science Understanding and Science as a Human Endeavour content of the unit and are integrated into the learning experiences.

- identify, research and construct questions for investigation; propose hypotheses; and predict possible outcomes
- design investigations, including the procedure/s to be followed, the materials required, and the type and amount of primary and/or secondary data to be collected; conduct risk assessments; and consider research ethics, including animal ethics
- conduct investigations, including using ecosystem surveying techniques, safely, competently and methodically for the collection of valid and reliable data
- represent data in meaningful and useful ways; organise and analyse data to identify trends, patterns and relationships; qualitatively describe sources of measurement error, and uncertainty and limitations in data; and select, synthesise and use evidence to make and justify conclusions
- interpret a range of scientific and media texts, and evaluate processes, claims and conclusions by considering the quality of available evidence; and use reasoning to construct scientific arguments
- select, construct and use appropriate representations, including food webs, to communicate conceptual understanding, solve problems and make predictions
- communicate to specific audiences and for specific purposes, using appropriate language, nomenclature, genres and modes, including scientific reports

Semester 2

Week	Key teaching points
1–4	<p>Marine: Oceanography</p> <ul style="list-style-type: none"> • cycling of nitrogen, carbon and water through a marine ecosystem • interdependence of organisms within a marine ecosystem, including food webs • factors that create ocean currents, including: <ul style="list-style-type: none"> ▪ wind ▪ Earth’s rotation – Coriolis force ▪ water temperature differences ▪ water density differences • global surface ocean currents: names, locations, and role in energy transfer • global atmospheric circulation systems, including: <ul style="list-style-type: none"> ▪ Southern Oscillation Index and Walker Circulation ▪ El Niño and La Niña • identification of cyclical changes in global atmospheric circulation systems (El Niño, La Niña) require systematic collection and analysis of data, such as air pressure and sea-surface temperature records, to reveal patterns over time (Science as a Human Endeavour)
5–6	<p>Marine: Environmental and resource management</p> <ul style="list-style-type: none"> • current issues affecting Western Australia’s fisheries (select local examples only), including: <ul style="list-style-type: none"> ▪ management practices ▪ fish population dynamics ▪ sustainable yields

Week	Key teaching points
	<ul style="list-style-type: none"> • an increase in the number of recreational fishers, together with an increased use of technology, (global positioning system [GPS], colour echo sounders) have impacted on the stocks of offshore demersal scalefish. Regulatory measures are used to protect stocks, and long-term sampling programs are undertaken, so that predictions can be made about fish numbers in the future (Science as a Human Endeavour) • modern fish marking, including tagging with increasingly sophisticated tracking devices, together with the parallel development of software to process the data gathered, has meant advances in the knowledge of fish behaviour and management (Science as a Human Endeavour) • aquaculture solutions to declining fish stocks <ul style="list-style-type: none"> ▪ types of aquaculture ▪ examples and locations ▪ environmental issues associated with aquaculture <p>Task 8: Test – Oceanography Task 9: Extended response – Marine resource management in-class assessment</p>
7–8	<p>Maritime: Design</p> <ul style="list-style-type: none"> • characteristics (cost, environmental, aesthetics, functionality) of maritime construction materials, including wood, metal, fibreglass and plastic • variation in vessel design according to specific use, including: <ul style="list-style-type: none"> ▪ commercial fishing boats ▪ dive boats ▪ yachts ▪ rigid inflatable boats <p>Task 10: Investigation – Comparing marine construction materials: Conservation</p>
9–10	<p>Maritime: History and archaeology</p> <ul style="list-style-type: none"> • background and location of Western Australian shipwrecks, including: <ul style="list-style-type: none"> ▪ <i>Zuytdorp</i> ▪ <i>Vergulde Draeck</i> • historical information found within a shipwreck • Western Australian law protecting wreck sites • the factors that influence the selection of artefacts for conservation and display • historical significance, value, aesthetics and impact of removal are determining factors used to influence decisions on conservation and display of maritime artefacts (Science as a Human Endeavour)
11–13	<p>Nautical concepts and skills: Seamanship skills</p> <ul style="list-style-type: none"> • operating a vessel safely • technological advances in conjunction with historical records and practices influence the methodologies of safe navigation and seamanship (Science as a Human Endeavour) • using berthing and mooring equipment • tying knots and appropriate use, including reef, bowline, sheet bend, clove hitch, round turn and two half hitches, coiling, throwing a line, using bitts and cleats • conducting a safety briefing • preparation and starting of motors • skippers logging on and logging off • departing the berth • performing a man overboard • driving a transit • performing a controlled stop • returning to the berth (secures vessel) <p>Task 11: Test – Maritime history and archaeology Task 12: Practical – Rope skills test</p>

Week	Key teaching points
14–15	<p>Nautical concepts and skills: Charting skills</p> <ul style="list-style-type: none">• estimating a position• position fixing: single bearing fix, and triangulations to locate position• performing distance, speed, time calculations• plotting latitude and longitude• reading tide charts, calculating tide heights, calculating tide charts (rule of 12ths)• calculating depth of water under boat• plotting a course• calculating magnetic variation and bearing conversions <p>Task 13: Extended response – Charting skills and passage planning</p>
16	<p>Task 14: Examination</p>