



Australian Government

Assessment Requirements for MEA705
Apply basic scientific principles and
techniques in aeronautical engineering
situations

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Modification History

Release 1 - New unit of competency

Performance Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria under the specified conditions of assessment, and must include:

- selecting appropriate basic aeronautical scientific principles to suit specific applications
- selecting appropriate basic aeronautical techniques and associated technologies, software and hardware to suit specific applications
- applying basic aeronautical scientific principles to particular engineering situations
- applying and manipulate appropriate formulas for applications involving engineering calculations
- applying appropriate calculations to engineering situations
- checking the validity of equations in using dimensional analysis
- applying basic aeronautical techniques and associated technologies, software and hardware in a manner appropriate to the application and identified scientific principles
- referring solutions to the original aim of the application
- quoting solutions in appropriate units, using appropriate significant figures
- quoting limitations of solutions, due to assumptions, scientific principles and techniques used
- presenting solutions referring to the original aim of the application.

Knowledge Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- basic aeronautical scientific principles, including:
 - statics, including analysis and application of:
 - forces and moments of forces
 - systems of concurrent and non-concurrent forces
 - dry sliding friction
 - dynamics, including analysis and application of:
 - Newton's Laws
 - kinematics and kinetics of uniformly accelerated linear motion
 - kinematics and kinetics of uniformly accelerated rotation
 - curvilinear motion and centrifugal force

- work, energy, power and torque
- mechanical advantage and efficiency
- strength of materials:
 - axial tension and compression
 - direct shear
 - bolted, riveted, bonded and welded connections
 - shear in beams
 - bending stresses and bending deflections (by standard formulas only)
 - torsion
- aerodynamics:
 - Bernoulli's Theorem
 - the atmosphere
 - aerodynamic forces (lift, drag, weight and thrust)
 - stability and control (to a level not requiring the application of calculus)
 - airscrews and propulsion (to a level not requiring the application of calculus)
 - aircraft performance (to a level not requiring the application of calculus)
- fluid mechanics:
 - properties of fluids, including mineral and synthetic hydraulic fluids
 - fluid statics, Archimedes' Principle and Pascal's Principle
 - fluid flow – continuity and energy conservation
 - fluid power – pumps
- thermodynamics:
 - heat transfer principles (conduction, convection and radiation)
 - perfect gas laws
 - kinetic theory of gases
 - laws of thermodynamics
- control concepts including closed and open loop control
- electricity and electronics:
 - basic electrical concepts
 - Ohm's Law
 - Kirchhoff's Current and Voltage Laws
 - basic DC circuits
 - basic power supply, transformer, rectifier, filter and regulator
 - PLC concepts – I/O, timing, counting, programming
 - electronic devices (discrete) – resistors, diodes, capacitors, inductors, transistors and rectifiers
 - microprocessor concepts
- light, sound and vibration:
 - wave behavior – standing vs travelling waves, transverse and longitudinal

- light – reflection, absorption, refraction, diffraction, spectrum, infrared, visible, ultraviolet, transmission medium and engineering applications
- sound – pitch, frequency, intensity (power), decibel scale, ‘noise dose’, spectrum, infrasound, audible, ultrasound, speed, natural frequency, resonance, transmission medium and engineering applications
- vibration – sources, balancing, shaft alignment, measurement, damping and engineering applications
- basic aeronautical techniques and related technologies, software and hardware associated with implementing scientific principles in aeronautical engineering solutions
- the applicability and limitations of basic aeronautical scientific principles
- the applicability and limitations of basic aeronautical techniques and associated technologies, software and hardware
- appropriateness of calculations
- fundamental and derived quantities
- common systems of units
- the procedure for converting between systems of units
- common prefixes used with units and their values
- the procedure for carrying out dimensional analysis
- the concept of significant figures
- the uncertainty of computations based on experimental data
- the procedures for determining the significance of figures in calculations
- the procedures for estimating errors in derived quantities.

Assessment Conditions

- This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is, the candidate is not in productive work, then a simulated working environment must be used that reflects realistic workplace situations and conditions.
- The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team.
- Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.
- Assessment methods must be by direct observation of tasks and include questioning on underpinning knowledge to ensure its correct interpretation and application.
- Assessment may be applied under project related conditions (real or simulated) and require evidence of process.
- Assessment must confirm a reasonable inference that competency is able not only to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.
- Assessors must be satisfied that the candidate can competently and consistently:
 - identify and explain the application of basic scientific principles and engineering techniques to aeronautical engineering situations

- for given aeronautical engineering situations, identify and apply the relevant basic scientific principles and techniques
- perform necessary calculations using appropriate applications and evaluate solutions
- document appropriately the outcome of application of basic scientific principles and techniques to given aeronautical engineering situations.
- Assessment may be in conjunction with assessment of other units of competency where required.
- Assessors must satisfy the requirements of the National Vocational Education and Training Regulator (Australian Skills Quality Authority, or its successors).

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.education.gov.au/Pages/TrainingDocs.aspx?q=ce216c9c-04d5-4b3b-9bcf-4e81d0950371>