

E281 SYSTEMS TECHNOLOGY (YEAR 12) – 2008 - 2009

Rationale

A practical subject used to develop an understanding of Systems Technology as applied to industry and the community. The subject will focus on two main areas; Systems, defined as the study of a group of things or parts forming a whole and Technology, the study of science and scientific knowledge, especially to industry. The subject will involve students in design, construction and implementation of more than one system. The type of systems may be selected from Mechanical, Pneumatic, Hydraulic, Robotics, Electrical, Electronic, Digital, Optical.

Subject Design

This subject stipulates a set of outcomes. These describe what the student can do as a result of studying the subject. On completion of the subject the student must have been provided with at least two opportunities to demonstrate achievement of each outcome.

A set of components is listed under each outcome. These components are specified for the development of each outcome and indicate how students will demonstrate achievement of the outcome in this subject. The teaching/learning program will give coverage to all components in order to ensure each outcome is appropriately addressed.

If schools wish to vary these components they may do so, provided it can be demonstrated that the outcomes are still able to be achieved and that the subject is still assessed through the common assessment framework described for the subject. Proposals for variations must be submitted to the Curriculum Council for approval.

The assessment framework, based on a series of generally defined common assessment tasks, has been stipulated for the subject. Each task measures student performance on a subset of subject outcomes. A generalised set of performance criteria supports the assessment framework.

A procedure for rating student performance on each outcome and allocating grades has also been stipulated.

Subject Outcomes

Within the context of Systems Technology the student is provided with opportunities to meet each of the following outcomes.

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| <p>Outcome 1: Analyses the social and environmental impacts of technological products and processes.</p> <p>Outcome 2: Applies research, graphical communication and information processing skills to the technology process.</p> <p>Outcome 3: Plans and works effectively with others.</p> <p>Outcome 4: Constructs or develops solutions to problems in the context of the technology process.</p> <p>Outcome 5: Develops and communicates specifications for a system.</p> <p>Outcome 6: Selects and uses appropriate tools, equipment and machines.</p> <p>Outcome 7: Makes appropriate decisions based on the diagnoses, testing and or analysis of systems.</p> <p>Outcome 8: Analyses systems, component parts or materials relevant to the technology process.</p> <p>Outcome 9: Analyses present and future work roles, training opportunities and career pathways within industry.</p> |
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Components of Outcomes

<p>Outcome 1: Analyses the social and environmental impacts of technological products and processes.</p>

The following components amplify the context and meaning of the outcome. The student:

- investigates the use of technology in the home or the workplace
- identifies effects to the environment and the consumer of technological products and processes
- analyses methods of waste disposal or recycling in the workplace

Outcome 2: Applies research, graphical communication and information processing skills to the technology process.

The following components amplify the context and meaning of the outcome. The student:

- uses appropriate occupational health and safety practices and procedures
- uses graphic communication skills to display market research in the design process
- analyses and presents results from testing or diagnosing
- uses graphical communication skills to present designs, plans, or procedures.

Outcome 3: Plans and works effectively with others.

The following components amplify the context and meaning of the outcome. The student:

- participates in discussions to solve problems
- works with others to set and meet goals and deadlines
- plans in detail and shows flexibility in achieving tasks on time

Outcome 4: Constructs or develops solutions to problems in the context of the technology process.

The following components amplify the context and meaning of the outcome. The student:

- selects and uses available resources effectively to construct a prototype or model
- constructs a model or prototype with attention to finish and detail
- evaluates the model or prototype in the context of the technology process.

Outcome 5: Develops and communicates specifications for a system.

The following components amplify the context and meaning of the outcome. The student:

- states function, problem, need or purpose
- establishes quality control processes
- records processes and components involved in implementation.

Outcome 6: Selects and uses appropriate tools, equipment and machines.

The following components amplify the context and meaning of the outcome. The student:

- uses appropriate occupational health and safety practices and procedures
- identifies the limitations of tools, equipment and machines
- considers the accuracy and ability of both the tools and the user.

Outcome 7: Makes appropriate decisions based on the diagnoses, testing and or analysis of systems.

The following components amplify the context and meaning of the outcome. The student:

- selects appropriate instruments and obtains data
- compares the performance of a system to the system specifications
- uses data to define and rectify faults
- selects and applies mathematical or scientific principles.

Outcome 8: Analyses systems, component parts or materials relevant to the technology process.

The following components amplify the context and meaning of the outcome. The student:

- analyses the types and properties of relevant materials and components
- identifies inputs, processes, outputs and feedback loops
- analyses and selects the types and properties of components.

Outcome 9: Analyses present and future work roles, training opportunities and career pathways within industry.

The following components amplify the context and meaning of the outcome. The student:

- analyses fields of employment, occupations and tertiary options related to Systems Technology
- considers ability and personal taste in the subject and relates it to future employment or career paths
- analyses relevant industry employment in terms of work roles and training.

Common Assessment Framework

The framework outlined below specifies a series of common assessment tasks for this subject. The teacher has the flexibility to select from the Systems Technology outcomes those to be assessed in each task. On completion of the subject the student must have been provided with at least two opportunities to demonstrate achievement of each outcome.

Each common assessment task measures student performance on a subset of subject outcomes. For each outcome measured in a task, student performance will be rated as Very High (V), High (H), Satisfactory (S) or Not Demonstrated (ND).

Task and Task Description

The term task should not be confused with 'project'. Each task may not be a separate individual project but a broad description of the type of activity that the student is to complete to satisfy the specified outcomes within that task. The organisation and number of 'projects' is up to the individual school, as long as all tasks are covered during the subject.

SYSTEMS TECHNOLOGY		
Task	Outcomes	Task Description
One	The teacher has the flexibility to select from the Systems Technology outcomes those to be assessed in each task.	Design Presentation of a systems implementation activity.
Two		Implementation Systems Implementation is the doing, making and practical application of systems. Where implementation can be referred to as the repair or restoration, assembly or modification, proto-type and testing or the manufacture of a technological systems.
Three		Investigation Investigation - Examine the development of a technological system.
Four		Analysis The display of a students knowledge, theory and understanding of systems.

The above set of tasks represent assessable activities that would be undertaken within a range of projects defined by the teacher at the commencement of the subject.

Common Assessment Tasks Booklet

The *Common Assessment Tasks* booklet for this subject further describes each task, and defines parameters for its completion. Schools are free to determine specific assessment details within these parameters. Copies of the booklet are available from the Curriculum Council and are included with the syllabus, on the Curriculum Council website (<http://www.curriculum.wa.edu.au>).

Performance Criteria

Ratings for student performance of each outcome will be based on the following criteria:

Outcome 1: Analyses the social and environmental impacts of technological, products and processes.

Satisfactory	High	Very High
The student investigates a technological system and describes a social and an environmental impact of a technological product, system or process. The student identifies an area of waste in the community.	The student identifies positive and negative features of a selected system, identifies an area of waste and comments on how it may be controlled. The student considers knowledge gained in the design process and states a change brought to the workplace through the development of technological systems.	The student makes judgements regarding the benefits to the environment and consumer of a technological system states where systems technology has contributed to the savings or waste of non renewable resources and uses this knowledge to assist in the design and implementation of systems and changes to the workplace.

Outcome 2: Applies research, graphical communication and information processing skills to the technology process.

Satisfactory	High	Very High
The student uses graphical communication skills to present plans, procedures or task details. Uses information processing to collate and present results.	The student uses graphical communication skills to present plans and procedures, displays market research in the design process and uses at least two formats to present the design, make, appraise and market process.	The student uses graphical communication skills to present plans or procedures, displays market research and presents the design, make, appraise and market problem using at least three formats. The student presents results from testing and uses graphs to clearly present information.

Outcome 3: Plans and works effectively with others.

Satisfactory	High	Very High
The student participates in group discussions, acts as part of a team in solving system design problems and works with others to establish goals and deadlines.	The student participates in group discussions, acts as part of a team in solving system design problems, plans in detail and shows flexibility in achieving tasks, and works with others to establish and meet required goals and deadlines.	The student establishes the needs of the group, participates in group discussions and acts as part of a team in solving system design problems. The student plans in detail, shows flexibility in achieving tasks and works with others to establish and meet required goals and deadlines.

Outcome 4: Constructs or develops solutions to problems in the context of the technology process.

Satisfactory	High	Very High
The student uses occupational health and safety practices and procedures with tools, equipment and machines and selects and uses appropriate resources effectively to produce a model or prototype.	The student applies occupational health and safety practices and procedures with tools, equipment and machines and selects and uses appropriate resources effectively to produce a model or prototype with attention to finish and detail according to design specifications.	The student applies occupational health and safety practices and procedures with tools, equipment and machines and selects and uses appropriate resources effectively to produce a model or prototype with attention to finish, detail and critical evaluation of the solution.

Outcome 5: Develops and communicates specifications for a system.

Satisfactory	High	Very High
The student accomplishes a set task and demonstrates an understanding of the types of sophisticated testing equipment available. The student breaks down systems in terms of input - process - output - feedback.	The student prepares reports and assists in the design, make, appraise and market process. The student operates sophisticated testing or measuring equipment with care and describes systems by breaking them down to input - process - output - feedback.	The student prepares a concise and comprehensive report using testing equipment and data collected. The student uses sophisticated testing or measuring equipment with a high degree of accuracy and care and describes systems by breaking them down to input - process - output - feedback and demonstrates knowledge of the interrelationships of sub-systems.

Outcome 6: Selects and uses appropriate tools, equipment and machines.

Satisfactory	High	Very High
The student selects correct testing equipment and uses care when testing a systems performance and collating results. The student compares results to technical information and specifications and makes comments about a particular systems performance.	The student collects information accurately and neatly, records results from performance testing of systems and draws conclusions from testing. The student ensures the accuracy of equipment and interprets results about a systems performance.	The student monitors a systems performance using tools, equipment and procedures, analyses a systems operation through data collected from testing and acknowledges how results can be determined accurately. The student considers the limitations of tools and equipment and understands the concept of errors and how to make allowances for errors in equipment.

Outcome 7: Makes appropriate decisions based on the diagnoses, testing and or analysis of systems.

Satisfactory	High	Very High
The student identifies parts and components correctly, lists steps showing how problems are to be solved, classifies components and parts correctly and creates parts and equipment lists. The student establishes a time line for completion of an activity.	The student demonstrates an organised approach, completes production and researches and demonstrates an understanding of the systems operation. The student defines and explains how to rectify faults and where possible is able to develop a time line for completion.	The student uses appropriate procedures to solve problems, clearly defines faults or possible faults in a system and demonstrates the procedures needed to rectify faults. The student demonstrates an understanding of the system, and researches to ensure a thorough knowledge of the system.

Outcome 8: Analyses systems, component parts or materials relevant to the technology process.

Satisfactory	High	Very High
The student identifies materials and properties used in systems, demonstrates an understanding of the effect new materials have had on the development of systems and examines ways of marketing and selling, comparing costs in planning production.	The student explains the properties and benefits of materials, identifies material by sight, acknowledges the effect materials have had on development and demonstrates an understanding of the need for marketing and selling. The student researches and compares the price of parts, components or equipment from different suppliers.	The student identifies materials by sight, identifies properties, understands the effect that materials have had on systems development and demonstrates appreciation of marketing used to promote systems, components or parts. The student conducts surveys or research when considering production and identifies selling points of a production item.

Outcome 9: Analyses present and future work roles, training opportunities and career pathways within industry.

Satisfactory	High	Very High
The student demonstrates an understanding of relevant career and employment pathways, is able to clarify the type of training required in industry and completes and maintains a work record.	The student collects information regarding employment prospects from a variety of sources, understands the career or employment options available and presents information from work experience regarding conditions, training and safety.	The student is able to synthesise information from diverse sources, demonstrates a knowledge of industry occupations, pathways and career options, and considers personal choices. The student shows a good appreciation of relevant industry jobs and training and documents work experience in terms of, conditions, training and safety.

Rating Procedure

Before a final grade can be awarded, the final rating achieved for each outcome must be determined. This is done using the following process:

- V is attained when at least 50% of ratings are at a Very High level, and at least 50% of the remainder are at a High level or better.
- H is attained when at least 50% of ratings are at a High level or better, and at least 50% of the remainder are at a Satisfactory level or better.
- S is attained when at least 50% of ratings are at a Satisfactory level or better.
- ND is attained when more than 50% of ratings are at a Not Demonstrated level.

Where a student fails to achieve a final rating of S for an outcome, teachers are encouraged to provide the student with an additional opportunity to demonstrate S if:

- the student has completed all the CATs incorporating that outcome; and
- the student has demonstrated S for that outcome in at least one task.

The additional opportunity should not simply be a repetition of a task, but should be an equivalent task which reflects a change of context in which the task is done.

Professional judgement should then be used to determine whether a final rating of ND or S is appropriate in each situation.

Grading Procedure

At the completion of this subject grades will be awarded in the following manner:

- A Very High in at least 50% of outcomes, and High or better in at least 50% of the remainder.
- B High or better in 50% of outcomes, and Satisfactory or better in the remainder.
- C Satisfactory or better in all outcomes.
- D Satisfactory or better in at least 50% of the outcomes.
- E Not Demonstrated in more than 50% of the outcomes.

A final rating of ND for any outcome will result in a grade of D being awarded.

Specific details giving examples of the combination of V, H and S resulting in different grades can be found in the *Common Assessment Tasks* booklet.

Time Allocation

The subject has been designed to be completed through a structured education program of approximately 110 hours in any suitable contexts and series of learning experiences. Typically the subject will be studied over the period of one school year. For administrative reasons schools wishing to vary this delivery pattern (e.g. over a shorter period or over a longer period up to two school years) are required to notify the Chief Executive Officer of the Curriculum Council.

Subject Completion

Students must complete the school's structured educational and assessment program for a subject in order to be eligible to receive a grade unless there are exceptional and justifiable circumstances. In situations where the school considers that insufficient information has been gathered to justify the award of a grade for the subject, a result of U (for unfinished) should be allocated. The Curriculum Council offers the flexibility for the U to be converted to a grade after the final grades have been submitted. Further details on assessment and grading are provided in Volume I of the Syllabus Manuals.