SECONDARY SCHOOL Principals and Head Teachers, Science

Science Courses Amendments

Effective for Preliminary Courses 2002, HSC Courses 2003

As a result of inquiries from teachers and after consultation with teachers and tertiary experts, this notice is to advise teachers of Stage 6 Preliminary and HSC courses of the attached amendments to science courses.

The amendments clarify particular aspects of each of the science courses. They will assist teachers to interpret the content and implement these syllabuses. The amendments are effective for the Preliminary courses in 2002 and the HSC courses in 2003.

A process has now commenced to identify content in each of the science syllabuses that may be set aside for the Preliminary course in 2003 and for the HSC course in 2004. Following consultation on these refinements we expect to be able to advise science teachers in October of the result of this process. Further to this a programming feasibility study will be undertaken to establish whether the content of science syllabuses can be delivered in the indicative time. We anticipate that as a result of any refinement, syllabuses will be available to schools for the start of 2003.

I would appreciate your assistance in ensuring that all science teachers have access to this notice and are reminded that the latest version of each Board syllabus is on the Board’s website (www.boardofstudies.nsw.edu.au).

If teachers require further assistance they should contact Rosemary Hafner, Board Inspector, Science on 02 9367 8136.

Gordon Stanley
President
26/4/02
SUBJECT: Amendments for the Stage 6 Preliminary Chemistry 2002 and HSC Chemistry Course 2003

Preliminary
p 17, 22, 28, 33 and 39: P11 should read ‘identifies and implements improvements to investigation plans’
p 27 column 2 dot point 4, column 3 dot point 3 add ‘molecular or covalent network’ after ‘covalent’
p 35 column 2 insert a new dot point 4 ‘describe hydrogen bonding between molecules’
column 2 last dot point delete ‘hardness and brittleness’
p 43 column 3 delete dot point 2

HSC
p 47, 53, 58, 63, 73, 80 and 86 delete ‘demonstrates and’ in H16
p 48 column 2 dot point 1 delete ‘catalytic’
column 3 dot point 3 delete ‘and use available …… polymer strands’
p 49 column 3 delete dot point 1
p 50 column 2 add a new final dot point ‘identify and use the IUPAC nomenclature for describing the straight-chain alkanols from C1 to C8’
p 51 column 2 dot point 6 replace ‘the use’ with ‘and use’
column 3 dot point 3 replace 'comparison to' with 'comparison to one of the following' and replace ‘mercury’ with ‘fuel cell’
p 52 column 2 dot points 2 and 3 delete ‘in nuclear reactors’
dot point 5 delete ‘-to determine…..chemistry’
delete column 3 dot point 1
p 53 Outcomes: insert H3 and H4 after H2
p 54 column 1 point 1 delete ‘first’
column 3 dot point 4 replace ‘101.3kPa’ with ‘100kPa’
p 55 column 2 replace dot point 2 with ‘identify acids including acetic (ethanoic), citric (2-hydroxypropane-1,2,3-tricarboxylic), hydrochloric, sulfuric and hydrobromic acid.’
column 2 dot point 3 delete ‘the concentrations of’
column 3 dot point 5 replace ‘acidic oxides such as sulfur dioxide’ with ‘acids’
p 56 delete column 2 dot point 8
p 57 column 2 dot point 4 delete ‘concentrated sulfuric’ and delete ‘and absorption of water’
insert a new dot point 2 ‘identify and use the IUPAC nomenclature for describing the esters produced by reactions of straight-chained alkanoic acids from C1 to C8 and alkanols from C1 to C8’
p 58 Outcomes: insert H4 after H3
p 59 column 3 delete dot point 3
p 60 column 1 point 3 delete ‘and/or energy content’
column 3 dot point 3 replace ‘analyse the’ with ‘measure one of the following’, delete ‘- nitrogen content of fertiliser’, ‘- ethanol in wine or beer’, ‘in each case’
delete column 3 dot point 5
p 61 column 2, dot point 2 insert ‘lower’ before ‘atmosphere’,
dot point 9 replace ‘halogens’ with ‘halons’
dot point 10 delete ‘and alkenes’
p 62 column 2 dot point 1 delete ‘nitrogen to phosphorus ratio’
SUBJECT: Amendments for the Stage 6 HSC Chemistry Options for 2003

HSC Options

p 64 column 2 dot point 4 add ‘for a given equation’ after ‘(K)’
   column 3 dot point 4 delete ‘a mixture of initial and’

p 66 column 2 dot point 6 delete ‘molecular’
   column 3 dot point 8 replace ‘emulsifying agent’ with ‘emulsifier’

p 69 column 2 dot point 3 delete ‘solid and’
   column 3 dot point 2 delete ‘pure’

p 70 column 2 delete dot points 1 and 2 and dot points, 1, 2, 3 and 4 in column 3

p 71 column 2 dot point 6 replace ‘the’ with ‘that’
   column 3 dot point 1 replace ‘design and’ with ‘choice of materials used in the’
   dot point 3 replace ‘alternate protection’ with ‘different protections’

p 72 column 2 dot point 2 replace ‘bacteria as…environments’ with ‘action of sulfate reducing bacteria’
   column 3 dot point 3 delete ‘or perform a first…alloy artefact’

p 74 column 2 dot point 2 delete ‘high energy’

p 74 column 3 dot point 6 replace ‘gather first hand data’ with ‘process data from secondary sources’

p 75 column 2 dot point 1 replace ‘are’ with ‘include’

p 76 column 2 dot point 3 insert ‘in’ after ‘involved’

p 77 column 1 point 8 replace ‘anaerobic’ with ‘aerobic’

p 78 column 2 dot point 6 replace ‘high energy compounds involved in’ with ‘compounds essential for’
   dot point 7 replace ‘reduction’ with ‘oxidation’ and delete ‘explain how … are broken’
   dot point 9 delete ‘high energy phosphate bonds in’

p 79 column 3 dot point 1 insert ‘anaerobic’ before ‘glycolysis’

p 83 column 2 dot point 7 replace ‘orbital’ with ‘shell’
   column 3 dot point 2 replace ‘orbits’ with ‘orbitals’

p 84 column 1 point 5 replace ‘chemistry’ with ‘chemical properties’ and ‘atomic’ with ‘electronic’
   point 6 insert ‘physical’ before ‘properties’

p 88 column 2 dot point 6 replace ‘are’ with ‘can be esters of’ before ‘alkanoic’ and delete ‘with’
   ….COOH’
   column 3 dot point 1 replace ‘to separate’ with ‘for’

p 90 column 2 dot point 2 replace ‘– electron spectroscopy,…tunnelling microscopy’ with ‘– gas chromatography, – high performance liquid chromatography’

column 2 delete dot point 9
SUBJECT: Amendments for the Stage 6 Preliminary Earth and Environmental Science Course 2002 and HSC Earth and Environmental Science Course 2003

Preliminary

p 26 column 2 dot point 11 add ‘(pre-oxygen)’ after ‘early’
p 27 column 2 dot point 1 replace ‘our’ with ‘developing an’
column 2 add 2 new dot points after dot point 2
   • ‘discuss the impact of photolysis on the composition of the early (pre-oxygen) atmosphere’
   • ‘outline the role of chemosynthesis in providing a suitable energy source for early organisms.’
p 28 column 2 replace dot point 8 with ‘identify that evidence from marine and lake sediments, ice cores and sea level changes suggests global temperatures have decreased over the last sixty million years’
p 31 column 2 dot point 2 replace ‘landscape’ with ‘natural landforms’
column 2 add a new dot point before dot point 1 ‘identify common rock forming minerals’
column 3 dot point 1 add ‘and use second hand data’ after ‘investigation’
p 36 column 2 delete dot points 5 and 6
column 3 dot points 2 and 3 replace ‘gather first-hand’ with ‘gather’
p 41 column 2 dot point 1 insert ‘(lithospheric)’ after ‘crustal’
column 2 dot point 2 replace ‘movements……forces’ with ‘plate movements, convection currents in the athenosphere and gravitational forces’
column 2 insert a new dot point after dot point 2 ‘outline differences between oceanic and continental crust’
p 42 column 2 insert a new dot point after dot point 5 ‘outline differences between plutonic and volcanic igneous rocks’

HSC

p 47 column 2 dot point 5 delete ‘describe …/continent boundaries’ and insert ‘distinguish between mountain belts formed at divergent and convergent plate boundaries’ before ‘in terms of’
column 3 dot point 1 replace ‘to compare and assess models’ with ‘about the cause’
column 3 dot point 3 replace ‘collision’ with ‘convergence’
column 3 delete dot point 2
p 52 column 2 dot point 6 delete ‘the first fossil’ and replace ‘and their similarity and relationships to’ with ‘with’
column 3 dot point 3 delete ‘first-hand information or’, replace ‘fossil’ with ‘ancient’
column 3 dot point 4 replace ‘fossil’ with ‘ancient’
p 53 column 2 dot point 3 replace ‘relevance … skeletons’ with ‘possible importance of the development of hardened body parts’
column 2 dot point 8 replace ‘the first land insects, lungfish and amphibians’ with ‘amphibians and reptiles’
column 3 dot point 5 delete ‘insects,’ replace ‘reptiles …..groups’ with ‘and reptiles’
p 54 column 2 dot point 4 replace ‘assess the’ with ‘assess a’ and replace ‘end Permian… event’ with ‘mass extinctions at the end of the Permian and at the end of the Cretaceous’
column 2 delete dot point 5
p 58 column 3 delete dot point 5
p 59 column 1 delete no 7
   column 2 dot point 1 replace ‘national and international strategies’ with ‘one international strategy’
column 3 dot point 2 replace ‘recent agreements in Kyoto’ with ‘the Kyoto Agreement’
p 60 column 1 no 8 replace ‘8 Rehabilitation and’ with ‘7 Rehabilitation and’
column 2 dot point 3 replace ‘mine site……mined areas’ with ‘rehabilitation of two contaminated sites’
column 3 dot point 2 delete ‘by developing…..simulation(s)’

Options

p 65 column 2 dot point 6 replace ‘imports’ with ‘impacts’
p 72 column 2 dot point 8 replace ‘evaluate’ with ‘discuss’ and replace ‘two…above’ with ‘mineralisation in the two mineral provinces above’
p 73 column 2 dot point 1 insert ‘that has impacted’ after ‘decision’
column 3 dot point 1 replace ‘the named’ with ‘a named’
PRELIMINARY

P 24 column 3 dot point 3 replace ‘showing wavefronts’ with ‘direction of particle movement’
column 3 dot point 4 insert ‘and’ after ‘frequency’ delete ‘and velocity’
column 3 dot point 6 insert ‘sound’ before ‘wave’
p 27 column 2 dot point 10 delete ‘technologies such as lenses or’
column 3 dot point 5 delete ‘compare……differences’
p 28 column 3 dot point 1 delete ‘petrological microscope’
p 33 column 3 dot point 7 replace ‘the process used to allocate’ with ‘the advantages in allocating’
p 34 column 3 dot point 5 delete ‘and use the available evidence’ and delete ‘and the impact…..electricity’
p 38 column 3 insert a new final dot point ‘solve problems and analyse information involving \( F = \frac{mv^2}{r} \) for vehicles travelling around curves’
p 40 column 2 dot point 5 replace ‘and speed humps….on vehicles’ with ‘in built up areas and the addition of air bags and crumple zones to vehicles’
p 44 column 2 dot point 7 insert ‘and’ after ‘\( \alpha \)’ and insert ‘particles’ after ‘\( \beta \)’
p 45 column 2 dot point 4 and column 3 dot point 3 replace ‘Third law’ with ‘Law of Periods’
column 3 dot point 8 replace ‘an otherwise … constructed’ with ‘black hollow container models a black body’

HSC

P 50 column 2 add a new dot point 2 ‘explain that a change in gravitational potential energy is related to work done’
p 52 column 2 dot point 5 replace ‘re-entry’ with ‘safe re-entry for a manned spacecraft’
column 2 dot point 6 replace ‘viable’ with ‘feasible’
column 3 dot point 1 insert ‘using \( F = \frac{mv^2}{r} \) after ‘Earth’
column 3 dot point 3 replace ‘chose’ with ‘choose’
column 3 dot point 4 replace ‘chose’ with ‘choose’ and replace ‘model’ with ‘demonstrate’
p 53 column 2 dot point 8 replace ‘meter’ with ‘metre’
column 2 dot point 12 add ‘mass increase,’ before ‘time’
column 3 dot point 1 replace ‘perform… to model the’ with ‘gather and process information to interpret the results of the’

\[
dot \text{point } 5 \text{ add } E = mc^2, \quad m = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}}, \quad \text{after using:}
\]

dot point 6 replace ‘relative’ with ‘comparative’ and add ‘at speeds approaching the speed of light’ after ‘travel’.
p 56 column 3 dot point 4 delete ‘switching devices and’
column 3 dot point 7 replace ‘compare advantages and disadvantages’ with ‘discuss advantages/disadvantages’
p 57 column 2 dot point 10 insert ‘describe the applications and’ before ‘explain’ and insert ‘AC’ before ‘induction’
column 2 delete dot point 9
p 60 column 2 dot point 5, column 3 dot point 3 replace ‘quanta’ with ‘quantum theory’
column 3 dot point 4 delete ‘breathalysers’
column 3 dot point 6 replace ‘debate’ with ‘differing views’
p 61 column 2 delete dot point 1
p 62 column 3 dot point 3 delete ‘first-hand’, replace ‘observe magnetic … material’ with ‘demonstrate magnetic levitation and relate this to levitation involving superconducting material’
column 3 dot point 7 replace ‘debate whether’ with ‘discuss the possibility that’ and replace ‘is’ with ‘may be considered’
SUBJECT: Amendments for the Stage 6 HSC Physics Options for 2003

Options

p 64  column 2 dot point 3 replace ‘each’ with ‘two’
column 3 dot point 1 delete ‘Huygen’s and’ and insert ‘data gathered from investigations involving’ after ‘using’
column 3 delete dot point 3

p 65  column 2 dot point 11 delete ‘and archaeology’
column 3 dot point 5 insert ‘and the altitude’ after ‘period’

p 66  column 2 dot point 12 insert ‘some of’ after ‘reluctance of’ and insert ‘in the absence of a mechanism for plate movement’ after ‘plates’

p 72  column 2 dot point 4 delete ‘selective’ and add ‘and atmospheric distortion’ after ‘radiation’
column 2 dot point 5 add ‘– active optics’ after ‘interferometry’
column 2 dot point 8 replace ‘with’ with ‘of’
column 3 dot point 1 replace ‘properties’ with ‘features’
dot point 5 replace ‘ground-based … measurement’ with ‘recent ground-based and space-based telescopes’

p 73  column 2 dot point 4 replace ‘explain’ with ‘describe’
column 3 dot point 3 add ‘by comparison with the spectra of standard stars’ after ‘classify stars.’
dot point 4 delete ‘photographic or digital’

p 74  column 2 dot point 8 add ‘by fusion’ after ‘in stars’
column 3 dot point 5 replace ‘from 0.1 to 10 solar mass’ with ‘, of 1, 5 and 10 solar masses’

p 76  column 2 insert a new dot point after dot point 7 ‘define diffraction and identify that interference occurs between waves that have been diffracted’

p 80  column 3 dot point 2 replace ‘silicon’ with ‘silica’
dot point 3 replace ‘data sources’ with ‘and analyse data and’

p 82  column 2 dot point 5 insert ‘an operational ‘before ‘amplifier’ and replace ‘amplifying circuits’ with ‘an inverting amplifier’

column 2 dot point 6 replace ‘amplifier is…V out/V in’ with ‘inverting amplifier is given by:

\[ \frac{V_{out}}{V_{in}} = -\frac{R_f}{R_i} \]

column 2 replace dot point 9 with 2 new dot points
  • discuss how feedback can be used in a control system
  • explain the use of two input resistors to produce a summing amplifier’
column 2 delete dot point 7 ‘define open loop….’
column 2 replace dot point 4 with the following new dot points
  • explain that the gain of an ideal amplifier is the ratio of its output voltage to its input voltage:

\[ \frac{V_{out}}{V_{in}} \]

• identify that an operational amplifier is an implementation of an ideal amplifier
• describe the characteristics of an operational amplifier
• distinguish between open-loop gain and closed-loop gain
• identify the voltage range over which an operational amplifier circuit acts as a linear device’

column 3 dot point 4 replace ‘distinguish….respectively’ with ‘show the transfer characteristics of an inverting amplifier’
column 3 dot point 5 insert ‘about setting the gain of an inverting amplifier by calculating the values of external resistors’ after ‘information’ and replace ‘, \[ \frac{V_{out}}{V_{in}} \] and \[ A_0 = \frac{V_O}{(V - V_1)} \],

with \[ \frac{V_{out}}{V_{in}} = -\frac{R_f}{R_i} \],

column 3 insert a new dot point 6 ‘perform a first hand investigation of a summing amplifier by adding voltages from two separate sources’
SUBJECT: Amendments for the Stage 6 Preliminary Senior Science 2002 and HSC Senior Science Course 2003

Preliminary
p 42 column 2 dot point 4 insert ‘some’ after ‘outline’

HSC
p 46 Outcomes: H1 and H3
p 48 column 2 dot point 8 delete ‘-an excretory organ’
column 2 delete dot point 7
p 49 column 1 no 5 insert ‘materials used in’ before ‘drugs’
column 2 dot point 1 add ‘based’ after ‘alcohol’
column 2 dot point 3 replace ‘where water is the solvent’ with ‘that dissolve in water’
column 2 dot point 4 replace ‘where alcohol is the solvent’ with ‘that dissolve in alcohol’
column 2 dot point 9 replace ‘on’ with ‘on/in’
column 2 dot point 12 delete ‘and relate this to their toxicity’
column 2 delete dot point 11
column 3 dot point 3 delete ‘identify data sources’ and replace ‘their’ with ‘its’
column 3 dot point 4 insert ‘the’ before ‘correct’, insert ‘treating’ before ‘the ingestion’ and replace ‘soluble’ with ‘liquid’
p 50 Outcomes insert H5 after H4
p 51 column 3 dot point 2 replace ‘process information’ with ‘gather information’
p 55 column 1 no 2 replace ‘the form of waves’ with ‘various forms’
column 2 dot point 3 replace ‘these’ with ‘information’
column 2 dot point 5 replace ‘ stereo’ with ‘sound system’ and ‘CDs’ with ‘CD players’
column 2 dot point 7 replace ‘FM radio waves’ with ‘FM radio’ and ‘AM radio waves’ with ‘AM radio’
p 56 column 2 dot point 3 replace ‘(AM, FM, TV waves)’ with ‘(AM, FM, TV)’

Options
p 62 column 2 dot point 1 replace ‘dentify’ with identify’
column 2 dot point 3 replace ‘or’ with ‘and’
column 3 dot point 1 delete ‘and present’ after ‘process’
p 63 column 3 dot point 1 replace ‘Standards Food Code’ with ‘Food Standards’
p 64 column 2 dot point 2 replace ‘nisin on’ with ‘nisin in’
column 2 dot point 5 replace ‘National Food Authority’ with ‘Australian Food Standards’
p 66 column 3 dot point 1 insert ‘to’ before ‘demonstrate’
p 67 column 1 no 3 replace ‘pharmaceticuals’ with ‘pharmaceuticals’
p 71 column 2 dot point 3 replace ‘P, S and L’ with ‘P and S’
column 2 dot point 7 insert ‘some of’ after describe and replace ‘involved in’ with ‘associated with’
column 3 dot point 2 insert ‘- Mercalli scale’ after ‘Richter scale’
p 74 column 1 no 3 delete ‘impacts’
column 2 replace dot point 6 with ‘discuss the reasons for the apparent weightlessness of an object in orbit’
column 2 dot point 13 replace ‘to biorhythms’ with ‘to these’
p 75 column 2 dot point 6 insert ‘used’ before ‘in space’
column 2 dot point 9 replace ‘Very long baseline interferometry’ with ‘Very Long Baseline Array’.
SUBJECT: Amendments for the Stage 6 Preliminary Biology Course 2002 and HSC Biology Course 2003

Preliminary
p 29 column 3 dot point 3 replace ‘nectar feeder’ with ‘predominantly nectar feeding animal’
p 34 column 3 dot point 1 replace ‘discuss’ with ‘outline similarities in the’ and replace ‘of one’ with ‘for one’
p 37 column 3 dot point 4 replace ‘key Australian’ with ‘some Australian’

HSC
P 43 Outcomes insert H3 before H4 and H7 before H11
p 46 column 2 dot point 6 insert ‘in some organisms’ after ‘wastes’
   column 3 dot point 8 delete ‘these’
 p 47 Outcomes insert H2 and H3 after H1
p 49 column 2 dot point 2 insert ‘fossils that have been considered as’ after ‘including’
   column 2 dot point 3 delete ‘adaptive radiation leading to’
   column 3 dot point 2 replace ‘physical and chemical’ with ‘physical or chemical’
   column 3 dot point 8 replace ‘Punnet’ with ‘Punnett’
p 50 column 2 dot point 1 replace ‘genes’ with ‘alleles’
   column 2 dot point 7 replace ‘and genes that’ with ‘and alleles that’
   column 3 dot point 1 replace ‘examples’ with ‘an example’
   replace “its advantages/disadvantages” with “the advantages and/or disadvantages of hybridisation”.
p 53 Outcomes insert H3 after H2
p 54 column 2 dot point 11 delete ‘and plants and animals’
   column 3 dot point 4 remove ‘classic’
p 55 column 1 number 6 replace ‘Burnett’s’ with ‘Burnet’s’
p 59 column 3 dot point 6 replace ‘a first-hand’ with ‘an’
p 60 column 3 dot point 4 replace ‘sounds of different frequencies’ with ‘sound’

HSC Options
p 63 column 3 dot point 3 delete ‘the rate of’
p 70 column 2 dot point 3 add ‘-hominin’ after ‘-hominid’
   column 2 dot insert a new dot point after dot point 3 ‘discuss the use of the terms hominin and hominid in terms the arbitrary nature of classification systems’
p 71 column 2 dot point 2 replace ‘Australopithecus ramidus’ with ‘Ardipithecus ramidus (Australopithecus ramidus)’, ‘Australopithecus robustus’ with ‘Paranthropus robustus (Australopithecus robustus)’, ‘Paranthropus boisei’ with ‘Paranthropus boisei (Australopithecus boisei)’ and insert ‘Australopithecus africanus’ into the examples
   column 2 dot point 3 replace ‘these hominid’ with ‘the above’
   column 2 dot point 4 insert ‘(multi-regional hypothesis)’ after ‘continuity’
   column 3 dot point 1 delete ‘of the named …the role’ and replace ‘in tracing’ with ‘used in tracing human’
   column 3 dot point 2 replace ‘hominid’ with ‘human’
   column 3 dot point 3 replace ‘hominid’ with ‘related to human evolution’
p 72 column 2 dot point 1 replace ‘a possible sequence of’ with ‘possible impacts of this’
   column 3 dot point 1 insert ‘the development and’ before ‘use of tools’
p 76 column 3 dot point 1 replace ‘that are useful’ with ‘that have been useful’