ASSETSC21, 2010
Adelaide December 11-20

Aboriginal Summer School for Excellence in Technology and Science

A Royal Institution of Australia national summer program of educational enrichment in the Sciences for Aboriginal and Torres Strait Islander year 10/11 students.

Program Information

OWNER’S NAME
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Section 1
Organisational information
**ASSETSC21 2010 Program**

**Cultural and Leadership Component.**
On Sunday 12th participants will spend a day at the Living Kaurna Cultural Centre where Professor Peter Buckskin from the University of South Australia’s David Unaipon College of Indigenous Education & Research will lead a series of cultural awareness activities. These will highlight the importance of Culture to all people in all endeavours, and focus in particular on the power derived by Aboriginal and Torres Strait Islander Australians from a knowledge of their traditional culture, and the importance of this knowledge to those who would accept leadership roles.

These activities will be informed by the ‘kit bag’ concept of culture: this recognises that individuals who can identify two (or more) cultures in their heritage may honour and build both cultures by selecting from either/both the ‘tools’ appropriate to particular situations.

The understanding of culture developed here will be honoured through the Academic program by presenters couching their material in terms of the culture in which they, as Scientists are immersed and the important contribution these cultures make to the success of practitioners in their professional endeavours.

**Academic Component.**

**TAFE day:** Monday 13th of December will be spent at the Panorama TAFE campus experiencing and experimenting with an introduction to Computer Aided Design and Manufacture (CAD/CAM). TAFE courses are valuable in their own right, plus many of them now articulate with University courses, so it is increasingly possible to commence tertiary study in TAFE and complete it in a University.

**Saturday 11th, Tuesday 14th & Wednesday 15th:** The program provides students with a detailed insight into two different areas of science: Nanotechnology and Preventative Health, and through ~45 minutes ‘Inspiration’ sessions brief snapshots of other areas. These activities build a knowledge base for ‘Expert Inquiry Groups’ of 3 or 4 students to pursue and report on structured inquiry topics the following week. Nanotechnology and Preventative Health are equally represented in these topics.

**Following days:** The Expert Inquiry Groups work on their tasks, preparing for group presentations to their peers on Monday 21st. Participants are supported by two Tutors drawn from the Flinders University School of Education post graduate students. In addition to the tutors, three or four Indigenous Mentors will provide culturally appropriate support to participants throughout the program.

Some skill development workshops are provided, to enhance students’ capacities in web page evaluation, the use of internet search engines, and effective use of PowerPoint presentations.

**Wiltja Residential Program**

Students will be accommodated at the Wiltja Residential Program (WRP) premises in Northgate, and bussed to ASMS and other program venues. Some of their evening time will be dedicated to visiting speakers and the preparation of small group presentations on “Springboarding off ASSETS” to be delivered at the WRP on the program’s last evening.
## 2010 STUDENT PARTICIPANTS:

<table>
<thead>
<tr>
<th>Participant</th>
<th>School</th>
<th>State</th>
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<tbody>
<tr>
<td>Belinda Prestwich</td>
<td>San Clemente High School</td>
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<tr>
<td>Tasmyn Menzies</td>
<td>St Andrew’s Catholic College</td>
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<tr>
<td>Lorraine Singe,</td>
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<td>Jarrhyn Canendo</td>
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<tr>
<td>Jasmine Blacka</td>
<td>Bremer State High School</td>
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<tr>
<td>Joseph Niddrie</td>
<td>Brisbane State High School</td>
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<tr>
<td>Andrew Coleman</td>
<td>Kilcoy state high school</td>
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<td>T’Kido Titasey,</td>
<td>St Augustines College</td>
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<td>James Uta,</td>
<td>St Augustines College</td>
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<td>Shaun Edwards</td>
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<td>Savannah Joseph,</td>
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<td>Larissa Takai</td>
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<td>Yazmine Bon</td>
<td>ST Monica’s College</td>
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<td>Isaac Tomkins</td>
<td>St Patrick’s College</td>
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<td>Tahlia Ghezzi</td>
<td>Mt Gambier High School</td>
<td>South Australia</td>
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<td>Tiahni Adamson</td>
<td>Cummins Area School</td>
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<td>Jade Pass</td>
<td>LORETO COLLEGE</td>
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<td>Ben Yarram</td>
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<td>Henrik Briggs</td>
<td>Parade College</td>
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<tr>
<td>Kylie Whitehead</td>
<td>Wodonga Senior Secondary College</td>
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<td>Mitchell Farrell</td>
<td>Mandurah Senior College</td>
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<td>Jordan Thompson</td>
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<td>Emma Garlett</td>
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<td>Teagan Garvie</td>
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<td>Jayden Dadleh</td>
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<td>Dehnym Doutch</td>
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<tr>
<td>Reggie Prosser</td>
<td>Swan View Senior High School</td>
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<tr>
<td>Kai Rivers</td>
<td>Swan View Senior High School</td>
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</tbody>
</table>
ASSETS Patron
Professor Peter Buckskin (David Unaipon College of Indigenous Education & Research)

ASMS Principal
Associate Professor Susan Hyde

Program Coordinator
Ian Maynard

Partnerships and Family Liaison
Rob Ball

Nanotechnology presenter
Brent Banham Flinders University

Preventative Health presenters
Professor Richard Head, and a team lead by Dr Peter Royle CSIRO

Data logging & CSI presenter, & lab support
Matt Jamieson, ASMS

‘Inspiration’ presenters
Dr Christian Sandor, University of SA
Dr Zoz Brooks; MIT Media Lab
Dr Alice Rumbold, University of Adelaide

‘Duty of Care’ Teachers
Alan Langham
Deb Fairey
Donna Shillingford

Indigenous Mentors
Liz Close
Joshua Andersen-Ward
Cass Brown

Tutors/ Program documenters
Dr. Catherine O’Halloran, Flinders University
Esther Dudley, Flinders University
Dr. Caroline Dean, Flinders University

Follow the Dream Coordinator
Visitor from Western Australia
Jane Pisan.

WRP after dinner speakers

**Topic: ASSETS Builds Leaders**
Saturday 14th

Danielle Ghezzi - a participant in the first ‘new’ ASSETS program in 2008.

**Topic: A Ngarranjeri Woman.**
Tuesday 14th

Pr. Peter Buckskin (Unaipon School Uni SA).

**Topic: Indigenous role models & leadership;**
Thursday 16th

Key Wiltja staff
Anthony Bennet (Manager)
Rosemary Ryan (Deputy Manager)
Cheryl Arthur (Wiltja Coordinator)
Sarah Brooksby
Jemielene O’Rourke
Serena Jakob
Irfana Jasic
Peter Pappin
Tom Duddy

Melissa Agius
Karen Tilley
Rosemary Ryan
Anique De Ruiter
Petra Eder
Melinda Richardson
Anna Leopardi
Geoff Oatway
Adrian Elson
Steve Rawson
Dennis Clark
Rowan Pullen
Maps

ASMS on Flinders University grounds

Living Kaurna Cultural Centre
Wiltja Residential Program (X marks the spot)

Wiltja Residential Program arrangements.

- Students will be allocated to 3-share rooms on the basis of ‘mixing’ states of origin.
- Students’ rooms will be in the male or female wing as appropriate, and both sets of rooms will have their own lounge area and adjacent kitchen; self-serve supper will be provided.
- Students are expected to maintain their rooms, lounge, and kitchen in a clean and tidy state.
- With the exception of certain off-campus excursions, male and female recreational activities will operate separately.
- Breakfast and evening meals will be provided in the program dining room.
- Packed afternoon tea (and sometimes Morning Tea) will be provided by the program.
- When at the ASMS, students will be provided with morning tea from the Flinders University ‘De Café’- paid for by the ASSETS program. On occasions, when students don’t have access to De Café, morning tea will be provided by the WRP.
- Lunch will generally be prepared by students under supervision.
- Facilities are available at the program for students to wash their own clothes. The Wiltja program is only responsible for the laundering of sheets and towels.
The Wiltja group program
Specific evening sessions have been identified during which students will be required to work in groups on a presentation to be delivered on the evening of Sunday 20th. Group composition will be different to the ASMS groups. The presentation will be entitled “Springboarding off ASSETS”

Wiltja staff will work with and support the students as they develop their presentations.

The framework within which the students will work on this project is as follows.

The final outcome will be a verbal group presentation to an audience of peers, Wiltja and academic program staff, and some visiting dignitaries.

Simple visual props are OK, but not essential.
The group may elect a spokesperson, or share the delivery.
The presentation should occupy from 7 – 10 minutes.

The presentation should provide an insight into the participants’ personal plans to ensure that the benefits of attending the ASSETS program are preserved and built on in terms of completing school and post-school pathways. The plan may include a number of things, which should include the following;

- Skills and knowledge developed or improved during the ASSETS program
- How to use what was learned during the program in the final years of school
- How to use what was learned during the program after leaving school
- What school/community/family supports need to be accessed to make the best use of has been learned during the program.
- What specific first steps will be taken, and when, in immediately putting this plan into action.

A ‘Take home package’
A Take home package will be provided at no cost to each participant at the farewell dinner on the night of Sunday 20th. It will consist of the following.

- A CD or DVD of ‘ASSETS Highlights’ images. Throughout both the ASMS and WRP based program activities, staff will capture both still and video images of highlights. An edited version of the video images and a selection of the still photographs will be burned to a CD or DVD.
- A laminated group photograph taken at the Wiltja Program on the evening of Saturday 19th.
- Perhaps some other goodies
SUPPORT AFTER THE PROGRAM:
Partnerships with Universities.
Partner Universities in each state and territory, through their various Indigenous Student Support Units, (ISSUs) have undertaken to maintain contact with ASSETS graduates over the next two years. This could involve phone and email contact to keep students aware of options at the university or to alert them to the specific role of the ISSU. In some cases it could involve invitations to special orientation activities or perhaps follow up summer schools in various disciplines. The universities in each state will be provided with student contact details and will use them as the means of contact. It is anticipated that more universities will be partnered early next year
Partner universities at mid November 2009 are

- Wollongong University
- Queensland Uni Technology
- James Cook University
- Curtin University of Technology
- Newcastle University
- University Sthn Queensland
- Royal Melbourne Institute of Technology
- Flinders University
- University of South Australia
- Monash University
- University of Tasmania
- Bachelor Institute
- Charles Darwin University
- Griffith University
- University of New South Wales
- Macquarie University

During 2010 a sub-group of the ASSETS steering committee- consisting of Patron Peter Buckskin, University of South Australia representative Dr Alan Barnes and Flinders University representative Dr Julie Clark- has commenced a scoping exercise in preparation for the establishment of an ongoing longitudinal study of ASSETS alumni.
Section 2

Program overview

See the next two pages.
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<th>Monday 13th Dec</th>
<th>Tuesday 14th Dec</th>
<th>Wednesday 15th Dec</th>
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<th>Saturday 18th Dec</th>
<th>Sunday 19th Dec</th>
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<td>10.30 – 11.00</td>
<td>Online survey</td>
<td>11.00 – 12.00</td>
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<td>Preventative Health/nutritional Science activities Peter Royle</td>
<td>Nanotechnolog y/Brent Banham</td>
<td>Expert Inquiry groups are allocated their topics and commence working on them</td>
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<td>Preventative Health delivery Richard Head</td>
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<td>Preventative Health delivery Richard Head</td>
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<td>Preveative Health/nutritional Science activities Peter Royle</td>
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<td>Expert Inquiry groups</td>
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<td><strong>Break</strong></td>
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<tr>
<td><strong>WR evening</strong></td>
<td>~6.30 PM welcome at Dinner</td>
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<td>Recreational activity devised by WR</td>
<td>Recreational activity devised by WR</td>
<td>Recreational activity devised by WR</td>
<td>Peter Buckskin ADS Leadership project time</td>
<td>Recreational activity devised by WR</td>
<td>Leadership project work/R&amp;R</td>
<td>Celebratory Dinner, Group presentations</td>
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</table>

**TAFE DAY**: Panorama campus: CAD/CAM focus: 4.00 – 4.45 PM

Sarah Rayner, Australian Electoral Commission

Major cultural activities (including Language groups and Indigenuity) (Environmental Science/Datalogging: Matt Jamieson) at the LKCC all day.

**Wednesday 15th Dec**

3.30 – 4.10: Inspiration 1 Christian Sandor Virtual reality at RiAus
4.10 – 4.20: Ian Maynard Expert Inquiry group process explained
4.20 – 5.00: Inspiration 2 Zoz Brooks ‘Strange Attractors’.

3.30 – 4.30: ‘Wrap up session’ for Nanotech and CSIRO.
4.30 – 5.00: Expert Inquiry groups announced & topics preferences discussed & collected

3.30 – 4.15: Inspiration 3 Alice Rumbold (at ASMS) Women’s reproductive health.
4.15 – 5.00: Expert Inquiry Groups continue work

**Friday 17th Dec**

Final group presentation preparation (may be too tired?)

**Saturday 18th Dec**

Final group presentation preparation (may be too tired?)

**Sunday 19th Dec**

Final group presentation preparation (may be too tired?)

**Monday 20th Dec**

Expert Inquiry presentat’s at ASMS

**ASSETS2010 Program book**
Notes.

ASMS = Australian Science & Mathematics School
WR = Wiltja Residence
LKCC = Living Kaurna Cultural Centre
ADS = After Dinner Speaker

‘Stream 1’ and ‘Stream 2’ are the major academic sections of the program, and they are ‘Preventative Health’ (CSIRO), and ‘Nanotechnology’ (Flinders University).

‘Inspirations’ are ~45 minute high ‘WOW’ factor cutting edge Science, Technology, Mathematics presentations.

Expert Inquiry groups- are students in groups of 3 or 4 working on unique tasks developed by the Stream 1 & 2 presenters- each group will present their findings on Monday 21st at ASMS.

The ‘group project’ at WRP requires the students to work in different groups from their Expert Inquiry Groups, to develop and deliver a presentation at WRP on the evening of Sunday 20th. The project and presentation are on the theme of “Springboarding off ASSETS”.
Section 3

Session details.
FRIDAY 10th December

Students arrive at Adelaide Airport during the day, are met and taken to the Wiltja Residence

Some ‘Get to know’ activities. Welcome dinner that night, program handbooks, polo shirts, name badges, ASMS usernames & passwords, flashdrives and some other goodies distributes.

Some program expectations explained.
SATURDAY 11th December

9.30- 10.00 AM
Arrive at the Australian Science and Mathematics School (ASMS).
ASMS Lower Learning Common: Formal welcome by ASSETS C21 Patron Professor Peter Buckskin, and ASMS Principal, Associate Professor Susan Hyde.
Response by participants’ representatives.
Meet the ASSETS staff members, a familiarisation tour of ASMS including identification of the areas dedicated to ASSETS, and ASMS IT policy, and login arrangements.

10.00- 10.30 AM
Morning tea break

10.30 -11.00
Participants complete ‘before’ Online Survey

11.00 AM 1.00 PM
'CRIME SCENE INVESTIGATION'; a group activity in the ASMS lab (Studio 8/9). The activity will be led by Matt Jamieson, and is detailed in the appendix 1 at the back of this document.

1.00 – 1.30PM
Lunch break.

1.30 – 3.00 PM
Initial Preventative Health presentation, by Professor Richard Head, CSIRO Preventative Health Flagship.
Venue; selected section(s) of the ASSETS area of ASMS.
Support materials will be provided separately.

3.00 -3.30 PM
Afternoon tea break.

3.30 – 5.00 PM
Initial Nanotechnology presentation, by Brent Banham, Science Communications Officer, Flinders University School of Chemistry, Physics and Earth Sciences.
Venue; selected section(s) of the ASSETS area of ASMS.
Support materials will be provided separately.

7.30 – 9.30 PM
After Dinner Speaker, at Wiltja. Gerrit Wanganeen- a participant in the first ASSETS program in 1992. Gerrit is now in the position of Assistant Director, Indigenous Education and Liaison, Indigenous Workforce Participation Team, in the Workforce Participation Group of the Australian Public Service Commission, and is based in Canberra.

His presentation, Titled ASSETS builds leadership will be followed by an introduction to the Springboarding off ASSETS group project by Wiltja staff member Dennis Clark.
SUNDAY 12\textsuperscript{th} December

9.30 - 10.30 AM
Arrive at the Living Kaurna Cultural Centre (LKCC); welcome by LKCC staff, and a guided Cultural tour of the wetlands provided by LKCC staff.

10.30 - 11.30 AM
\textit{Culture; it informs us all.}
A series of activities delivered by Professor Peter Buckskin, designed to explore and emphasise the importance of Culture to all people, and in particular to Aboriginal and Torres Strait Islander Australians.

11.130– 11.45 AM
Morning tea break.

11.45 AM – 12.30PM
\textit{Culture; it informs us all continued}

12.30 – 1.30 PM
Special ‘Bush Basket’ Lunch provided by Daphne Rickett 😊

1.30 – 3.30 PM
Datalogging/Environmental Biology activity presented by Matt Jamieson. Activity contents are shown in appendix 2 at the rear of this booklet..

3.30 – 4.00 PM
Afternoon tea break and early departure. (Afternoon tea might be on the buses, returning to WRP).

Evening recreational activities, organised by WRP staff
Monday 13\textsuperscript{th} December

9.30- 10.15 AM  
Arrive at the Panorama TAFESA Campus (See map on following page)  
Greetings, introductions and a brief tour.

10.15- 11.15 AM  
\textbf{Computer aided design and construction activity}  
Students will be divided into two groups  
Group A – Participants will be able to immediately work with AutoCAD’s 2011 Inventor package to produce 3D parametric models in full colour with different surface finishes. The participants will each have the opportunity to plot their models.  
Group B – participants will be given an introduction into the fundamentals of bridge design. Examples both local and world-wide will be shown in order to enhance an appreciation of the different elements that lead to a high load bearing bridge.

11.15 – 11.45 AM  
Morning tea break.

11.45 AM – 12.45PM  
\textbf{Computer aided design and construction activity ctd}  
Group A – Participants will be given an introduction into the fundamentals of bridge design. Examples and models both local and world-wide will be shown in order to enhance an appreciation of the different elements that lead to a high load bearing bridge.  
Group A – Participants will be able to immediately work with AutoCAD’s 2011 Inventor package to produce 3D parametric models in full colour with different surface finishes. The participants will each have the opportunity to plot their models.

12.45 – 1.30 PM  
Lunch break

1.30 – 4.00 PM (with refreshments \textit{while you work})  
\textbf{BRIDGE BUILDING COMPETITION}  
Participants will be divided into a number of small teams. The teams are given two hours to design, purchase materials and build a bridge to specific requirements. The only materials available are 20mm electrical conduit, bamboo sticks, duct tape and poly string. Each team will be required to test their bridge by letting one member walk across it and then subjecting it to an increased load to failure.

4.00 – 4.45 PM  
\textbf{Presentations by TAFE staff}  
Brief presentations to participants by TAFE staff.

Information session re Electoral processes.  
Address by Sarah Rayner, Field Officer, Indigenous Electoral Participation Program, South Australian State Office; Australian Electoral Commission.

7.30 – 9.30 PM  
After Dinner Speaker: Danielle Ghezzi, from the 2008 ASSETS program. Danielle is currently studying first year medical science at the University of South Australia, and her presentation is titled “\textbf{A Ngarranjeri Woman}.” Following this participants will have time to work on their ‘Springboarding off ASSETS’ group presentations.
Panorama TAFESA Campus Map.

Buses unload in or near the GOVT PARK, directly north of the building, but don’t park in it. Best entry is from Shepley Avenue on the eastern border.

Private cars (or buses staying for any period of time) use the Car Park to the immediate North of the GOVT PARK.
TUESDAY 14th December

9.30 AM
Arrive at the CSIRO premises, Gate 13, Adelaide University, Kintore Avenue, Adelaide; see map on the next page.

9.30-10.00 AM
Introduction in the CSIRO seminar room

10.00-10.45 AM
Students organised into 4 groups. First Health activity; a different one for each group.

10.45-11.15 AM
Morning tea provided by CSIRO

11.15 AM-12.30 PM
Second Health activity; a different one for each group.

12.30-1.15 PM
Lunch with staff in the CSIRO South Room (Lunch provided by CSIRO)

1.15-2.45 PM
Third and fourth Health activities; two per group.

2.45-3.00 PM
Wrap-up in CSIRO Seminar Room. Give out CSIRO bags and farewell

3.00 – 3.30 PM
Walk to the RiAus, Science Exchange, Exchange Place, Adelaide CBD. 
Afternoon tea on the move

3.30 – 4.10 PM
Inspiration 1 Christian Sandor Virtual reality

4.10 – 4.20 PM
Expert Inquiry group process explained; Ian Maynard

4.20 – 5.00PM
Inspiration 2 Zoz Brooks ‘Strange Attractors’.

Evening recreational activities, organised by WRP staff
WEDNESDAY 15th December

9.30 AM
Arrive at Car Park 9, Flinders University and meet Brent Banham at the entry door to the Earth Science building (building 45) marked with a black arrow on the second map on the following page.

9.30 - 9.45 AM
Expert Inquiry group preferences collected by Ian Maynard.

9.45 AM - 1.00 PM (With a morning tea break)
Nanotechnology presentation, by Brent Banham, Science Communication Officer, Flinders University.

1.00 - 1.30 PM
Lunch break

1.30 - 3.00 PM
Nanotechnology presentation continued.

3.00 - 3.30 PM
Afternoon tea

3.30 - 4.30 PM
Wrap of presentations and explanation of the Expert Inquiry Group topics by Brent Banham and Richard Head. (Guiding rubrics for the topics are in Appendix 2 at the back of this document.)

4.30 - 5.00 PM
Expert Inquiry Groups compositions announced by Ian Maynard, and the groups consider and provide their preferences for topics to investigate.

7.30 - 9.30 PM
Recreational activity at Wiltja.
Flinders University map.

Earth Sciences location map.

- Entry door here
- Car park 9 here
THURSDAY 16th December

9.30 AM
Arrive at ASMS.

9.30 – 10.15 AM: LC9
Address by Che Cockatoo-Collins; Santos representative

10.15 – 11.00 AM LC7, 8 and 9
Concurrent workshops presented by ASSETS staff
- Website evaluation
- Effective presentation skills
- Analysis of ASSETS EIG Rubrics

11.00 – 11.30 AM:
Morning Tea break.

11.00 AM – 3.00 PM: various ASMS venues
Expert Inquiry Groups are allocated their Inquiry Topics, and commence work on them. (With a lunch break)

3.00 – 3.30 PM
Afternoon tea

3.30 - 4.15PM: LC9
Inspiration 3
Alice Rumbold
The causes and consequences of women’s reproductive health problems.

4.15 – 5.00 PM various ASMS venues
Expert Inquiry Groups continue with their work.

7.30 – 9.30 PM
After Dinner Speaker, Professor. Peter Buckskin, ASSETS C21 Patron.
Topic: Indigenous Role models and leadership
Time to work on the Springboarding off ASSETS group project.
FRIDAY 17th December

9.30 AM
Arrive at ASMS.

9.30 AM- 5.00 PM (With morning/afternoon tea and lunch breaks)
Expert Inquiry Groups finalise their Inquiry tasks and the preparation of their presentations to be delivered on Monday 20th

7.30 – 9.30 PM
Recreational activity organised by Wiltja staff.

SATURDAY/SUNDAY 18th & 19th December

Recreational activities organised by Wiltja staff.

Some evening time to work on the Springboarding off ASSETS group project, if participants are not too exhausted after their recreational activities

SUNDAY 19th

6.00 – 6.45 PM
Farewell dinner, participants are given their ‘Take Home Packages’.

6.45 – 8.45 PM
Students deliver their Springboarding off ASSETS presentations.
9.30 AM
Arrive at ASMS.

9.30 AM- approx 12.30 PM (With a morning tea break)
Expert Inquiry Groups present the findings from their inquiries to an audience of their peers, ASSETs staff and invited guests.
Formal farewell.
Venue: ASMS Lower Learning Common.

12.30 - ~1.15 PM
Participants complete the ‘after’ version of the online survey (~ 20 minutes), and then final departure arrangements will get underway.

ASSETS C21 2010 concludes.
Crime scene investigation

Your task: Working as a team, divide the labour to examine all the evidence supplied. It is a race against time, you may not be able to perform all the tests before the guilty suspect sneaks out of the country.

One of you will have to start the DNA test straight away because of the time involved.

Your team has been provided with a test kit and instruction booklet that will enable you to carry out all of the required tests.

When you have analysed all of the evidence you will have to regroup to discuss your findings and decide on the culprit to be arrested.

You will have 2-3 minutes to present your conclusions, stating what you set out to investigate, what process did you follow, your evidence and conclusions.

Created by Dr N. Davis in consultation with M. Jamieson November 2005
Crime scene report:
7:15 am Monday January 15th 2007

000 telephone call received from Mrs. Genevieve Mignone. The family home front door has been jimmied open. Her daughter, Anne, is missing. Anne is the key witness to a court case beginning today. Anne is a trainee office worker in the organization “The Australian Science & Mathematics School”. Anne was not aware that this organization is actually a front for the highly illegal and notorious terrorist cell “Al Gebra”. Foul play is suspected.
THE SUSPECTS

ID Number 902101 Alicia “Fluffy” Coleman

Despite her harmless appearance “Fluffy” Coleman is a tough and resilient leader of the DECS Terrorist Cell “Al Gebra”. It was this very organization that Ms Anne Mignone was due to testify in court against. “Fluffy” Coleman has been seen driving her car twice down the Mignone family’s street in the last week. Rumour has it “Fluffy” is pregnant……

ID Number 902102 Andy “Fingers O’Malley” Stone

Long time drinking buddy of Ms Anne Mignone and Richard “Knuckles Dillinger” Leach at “Mick O’Shea’s Irish Pub”. Tensions rose between Ms Anne Mignone and “Fingers O’Malley” Stone when Ms Mignone began dating “Fingers O’Malley” Stone’s brother “Rhino” Stone, whilst she was still romantically involved with her previous boyfriend.

ID Number 902104 Richard “Kuckles Dillinger” Leach

“Kuckles Dillinger” Leach is Alicia “Fluffy” Coleman’s right hand man in the DECS Terrorist Cell “Al Gebra”. “Kuckles Dillinger” Leach is the co-ordinator of “Robotics” in the “Al Gebra/The Australian Science & Mathematics School” organization. We all know that “Robotics” is code for terrorist activities. His previous employment was in Plant Research, looking at weapons of mass introduction.
THE SUSPECTS

ID Number 902104 Rocco “Pussywillow” Tripodi

“Pussywillow” Tripodi is a jack-of-all –trades at the ASMS. If anybody knows where to hide a body in the closet so that it wouldn’t be found; here is the suspect. A quiet and unassuming man who puts his family first. Was seen to have a disagreement with Ms Mignone about the quality of coffee supplied by the ASMS.

ID Number 902105 Deb “Doom Pooch” Smith

The Mignone’s family’s next door neighbour, having been neighbours for eleven years. Recently tensions between the two families arose when Mrs. Genevieve Mignone received first prize in the cake baking section of the Royal Adelaide Show, relegating Deb Smith (who had won the section for the previous decade) to second.
Forensic Test Kit Contents

6 Powder Samples  
6 Fabric Samples  
6 Soil Samples  
6 Hair Samples

1 Carbon Brush  
1 Carbon Container  
1 Carbon Dusting Tray

1 Large Test Tube Rack  
6 Large Test Tubes  
1 Small Test Tube Rack  
8 Small Test Tubes  
4+ Large Test Tube Rubber Bungs

1 Dropper Bottle HCl  
1 Dropper Bottle Universal Indicator  
1 Dropper Bottle Barium Sulphate  
1 Universal Indicator Chart  
1 Spotting Plate

1 Permanent Marker  
1 Ruler

1 25ml Measuring Cylinder  
1 10ml Measuring Cylinder

1 Box Microscope Slides  
1 Box Coverslips

1 Spatula Large  
1 Spatula Small  
1 Tweezer  
1 Distilled Water Bottle  
4 Plastic Pipettes
EVIDENCE AVAILABLE and approximate analysis times
Note: data analysis sheets are provided in the Crime Scene Investigation Kit.

N.B. DO NOT MIX UP SAMPLES, YOU COULD RUIN THE CASE

DNA sample
- Instructions will be given during session.
- Crime scene sample; believed to contain DNA from the perpetrator.
- DNA of five suspects viz Fluffy, Fingers O’Malley, Knuckles Dillinger, Doom Pooch and Pussywillow.

Hair samples 30 mins
- Crime scene sample 0142, believed to contain at least two different hair types.
- Samples of hair obtained from the suspects; Fluffy (ID# 5329), Knuckles Dillinger (ID# 7634), Pussywillow (ID# 6441), Fingers O’Malley (ID# 7643) and Doom Pooch (ID# 0842).
  Turn to page F9 for instructions about hair analysis.

Fibres 30 mins
- Crime scene sample ID# 1134.
- Samples collected from the clothing worn by the suspects at the time of the abduction; Fluffy (ID# 1135), Knuckles Dillinger (ID# 1136), Pussywillow (ID# 1137), Fingers O’Malley (ID# 1138) and Doom Pooch (ID# 1139).
  See page F9 for fibre analysis.

Soil 80 mins
- Crime scene sample.
- Samples from shoes of all suspects; Fluffy (ID# 2830), Knuckles Dillinger (ID# 2831), Pussywillow (ID# 2832), Fingers O’Malley (ID# 2833) and Doom Pooch (ID# 2834).
  For analysis of soil samples see pages F9-F11.

Suspicious powder 30 minutes CAUTION
- A suspicious looking powder was obtained from the crime scene (sample # 2547).
- A similar looking powder was discovered on the clothing of all 5 suspects. Treat with caution. Is it the same powder in all samples? (Pussywillow ID# 2548, Fluffy ID# 2549, Fingers ID# 2550, Knuckles ID# 2551, Doom Pooch ID# 2552).
  For analysis see page F11.

Fingerprints 15 mins
- Crime scene sample containers with prints to be visualized
- Prepared print samples from crime scene if you cannot manage your own (ask)
- Print samples of all suspects
  Print analysis pages F12-F13.

Infra Red Spectroscopy 10 mins
- Crime scene samples to be visualized
  Print analysis pages F14-F21.
CAUTION: When using microscope, always wind the microscope stage (the part that holds the slide) down away from the microscope lens as far as the stage will travel. Ensure that the microscope has the 4X lens in place (the lens with the red band). Begin winding the microscope stage towards the sample very slowly, whilst looking through the eyepieces at the sample. The sample will go in and out of focus very quickly so beware. Do not attempt to look at the sample by winding the stage up if you have the 10X lens or above in position. These lenses are longer and will cause the lens to strike the slide if wound up too far. Once you have the sample in view on the 4X lens, simply rotate the lenses to the 10X and 40X lenses. At this point the microscope will only require minor focusing to remain in view so use the fine adjustment (small knob) on the focus knobs.

1. Use tweezers to place the sample of hair or other fibre on the microscope slide.
2. Use the scale in the eyepiece to estimate the length and thickness of the hair sample.
3. Record the colour and texture of the sample.
ANALYSIS OF SOILS

1. **SOIL COMPOSITION BY DENSITY/ % COMPOSITION**  30 minutes
   - Take a spatula and place approximately 1 cm depth of each soil sample in a separate labeled test tube.
   - Add 10 mL of distilled water and place a cork in the mouth of each tube.
   - Holding the cork in with your thumb, shake vigorously for 10 seconds.
   - Place the tubes in a rack to allow the contents to settle while you go on with the other soil analyses.
   - Come back after 5 minutes and examine the tubes.
   - Group the tubes as “Similar to crime scene sample” or “Different from crime scene sample”.
   - Record the height of each layer in the crime scene test tube and report this as a percentage.

---

**Crime scene sample**

- **Vegetable matter (floats)**
  - Record thickness of layer e.g. 2mm
- **Test tube**
- **Silt**
  - Record thickness of layer e.g. 5mm
- **Clay**
  - Record thickness of layer e.g. 8mm
- **Sand and gravel**
  - Record thickness of layer e.g. 3mm

---

<table>
<thead>
<tr>
<th>Layer</th>
<th>Thickness in mm</th>
<th>% = 100 * t/ T</th>
<th>F</th>
<th>K</th>
<th>P</th>
<th>F</th>
<th>DP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetable t1</td>
<td>(Example) 2</td>
<td>100 x 2/18= 11%</td>
<td>12%</td>
<td>20%</td>
<td>10%</td>
<td>0%</td>
<td>9%</td>
</tr>
<tr>
<td>Silt t2</td>
<td>5</td>
<td>100 x 5/18= 28%</td>
<td>25%</td>
<td>3%</td>
<td>30%</td>
<td>5%</td>
<td>30%</td>
</tr>
<tr>
<td>Clay t3</td>
<td>8</td>
<td>100 x 8/18= 44%</td>
<td>46%</td>
<td>10%</td>
<td>45%</td>
<td>15%</td>
<td>44%</td>
</tr>
<tr>
<td>Sand/gravel t4</td>
<td>3</td>
<td>100 x 3/18= 17%</td>
<td>17%</td>
<td>67%</td>
<td>15%</td>
<td>80%</td>
<td>17%</td>
</tr>
<tr>
<td><strong>Total thickness T</strong> (add t1+t2+t3+t4)</td>
<td>18</td>
<td>Total = 100%</td>
<td>✔</td>
<td>x</td>
<td>✔</td>
<td>x</td>
<td>✔</td>
</tr>
</tbody>
</table>
ANALYSIS OF SOILS (Cont.)

2. PRESENCE OF LIMESTONE OR OTHER CARBONATES  10 minutes
   • Many soils in Adelaide contain limestone (Calcium carbonate) or other carbonate minerals.
   • Check for their presence by placing a spatula full of each sample in a separate well of a tile.
   • Label each sample.
   • Add three drops of the hydrochloric acid to each sample and **look for any fizzing**. Fizzing indicates that CO₂ is being released from the carbonate minerals.

   \[
   \text{2 HCl} + \text{CaCO}_3 \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2
   \]

   Hydrochloric Acid  Calcium Carbonate  →  Calcium Chloride  Water  Carbon Dioxide

   Tick all the samples on the record sheet that have the same reaction as the crime scene sample. **It could mean that the suspect was at the crime scene.**

3. VISIBLE COMPONENTS  30 minutes
   • If you have time, place a sample of each soil under the microscope and record any striking observations e.g. coloured grains, odd shaped particles.

4. SOIL PH  10 minutes
   • The acidity of soils varies from place to place, even in small areas.
   • Place a small sample of the soil on a tile.
   • Add 4 drops of Universal Indicator.
   • Sprinkle the white visualizing powder (Barium Sulphate) onto the moist soil so that you can see the colour of the indicator.
   • Use the colour chart to record the pH of the sample.

ANALYSIS OF SUSPICIOUS POWDERS  5 minutes + 25 minutes

1. Place a small quantity of the powder in a micro test tube and add water from a squash pipette. See if the powder dissolves.
2. Place a sample of each of the white powders on a separate slide and examine each on the microscope stage. Draw, describe or photograph the sample.

ANALYSIS OF FOOT PRINT  5 minutes

1. Try a range of shoes found in the suspect’s homes to see if there is a match to the Crime Scene foot print.
FINGER PRINTS  15 minutes

If time is running short, thumb prints taken from the crime scene are available for comparison with thumb prints from each of the suspects.

Use the magnifying glass to examine the prints and decide if any suspect prints match those of the crime scene.

TO DETECT PRINTS FOR YOURSELF

- Collect the crime scene article.
- **Be careful not to contaminate the article with your own prints. Use latex gloves.**
- Use a very small quantity of the black powder applied to the soft bristled brush.
- Brush the powder onto the surface of the article to see if you can find any prints.
- Take a sticky tape impression of the prints.
- Examine them using a magnifying glass and compare them to the thumb prints on file at the police district headquarters. (Copies are in your kit).

- METHOD 2 (If available)
- Allow vapours from a superglue tube to make contact with the article.
- The vapours will condense on the oils in the print and make it visible.
An unidentified organic liquid has been found at the crime scene.

A number of organic liquids have been found at the suspect’s homes.

Which of the suspects has the unidentified liquid in the house?

Infra red wavelength light occurs in the range of 4000-1000 cm\(^{-1}\).


The actual process to identify the bonds within a structure is that a beam of infrared light is produced and split into two separate beams. One is passed through the sample, the other passed through a reference which is often the substance the sample is dissolved in (if naturally a solid). The beams are both reflected back towards a detector, however first they pass through a splitter which quickly alternates which of the two beams enters the detector. The two signals are then compared and a printout is obtained.

A reference is used for two reasons. This prevents fluctuations in the output of the source affecting the data and this allows the effects of the solvent to be cancelled out (the reference is usually a pure form of the solvent the sample is in).

The absorptions in this range do not apply *only* to bonds in organic molecules. IR spectroscopy is useful when it comes to analysis of inorganic compounds (such as metal complexes or fluoromanganates) as well.

Table overleaf has been generated from information at;

http://en.wikipedia.org/wiki/Infrared_Spectroscopy_Correlation_Table
<table>
<thead>
<tr>
<th>Bond</th>
<th>Type of bond</th>
<th>Specific type of bond</th>
<th>Absorption range and intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-H</td>
<td>alkyl</td>
<td>methyl</td>
<td>1380 cm(^{-1}) (weak), 1260, 2870 &amp; 2960 cm(^{-1}) (strong)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>methylene</td>
<td>1470 cm(^{-1}) (strong) and 2850, 2925 cm(^{-1}) (both strong to medium)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>aromatic</td>
<td>3070 cm(^{-1}) (weak)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>monosubstituted</td>
<td>700-750 cm(^{-1}) (strong) and 700±10 cm(^{-1}) (strong)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>benzene</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>alkynes</td>
<td>3300 cm(^{-1}) (medium)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>aldehydes</td>
<td>2720, 2820 cm(^{-1}) (medium)</td>
</tr>
<tr>
<td>C-C</td>
<td>C-C</td>
<td>Alkenes</td>
<td>1660 cm(^{-1}) (medium)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with benzene ring</td>
<td>1625 cm(^{-1}) (strong)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with C=O</td>
<td>1600 cm(^{-1}) (strong)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>aromatic C=C</td>
<td>1450, 1500, 1580, 1600 cm(^{-1}) (strong to weak) usually 3 or 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>terminal alkynes</td>
<td>2100-2140 cm(^{-1}) (weak)</td>
</tr>
<tr>
<td>C=O</td>
<td>aldehyde/ketone</td>
<td>aldehydes</td>
<td>1725 cm(^{-1})</td>
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<tr>
<td></td>
<td></td>
<td>carboxylic acids/derviates</td>
<td>saturated carboxylic acids</td>
</tr>
<tr>
<td></td>
<td></td>
<td>esters</td>
<td>1735 cm(^{-1})</td>
</tr>
<tr>
<td>O-H</td>
<td>alcohols, phenols</td>
<td>carboxylic acids</td>
<td>3500-3560 cm(^{-1}) (concentrating samples broadens the band and moves it to 3000 cm(^{-1}))</td>
</tr>
<tr>
<td></td>
<td></td>
<td>esters</td>
<td>3610-3670 cm(^{-1}) (concentrating samples broadens the band and moves it to 3200-3400 cm(^{-1}))</td>
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<tr>
<td>N-H</td>
<td>primary amines</td>
<td>doublet at 3400-3500 cm(^{-1}) and 1560-1640 cm(^{-1}) (strong)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>secondary amines</td>
<td>above 3000 cm(^{-1}) (medium to weak)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ammonium ions</td>
<td>broad bands with multiple peaks between 2400-3200 cm(^{-1})</td>
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<tr>
<td>C-O</td>
<td>alcohols</td>
<td>primary</td>
<td>1050±10 cm(^{-1}) (strong, broad)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>secondary</td>
<td>around 1100 cm(^{-1}) (strong)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>tertiary</td>
<td>1150-1200 cm(^{-1}) (medium)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>phenols</td>
<td>1200 cm(^{-1})</td>
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<tr>
<td></td>
<td></td>
<td>ethers</td>
<td>1120 cm(^{-1})</td>
</tr>
<tr>
<td></td>
<td></td>
<td>aromatic</td>
<td>1220-1260 cm(^{-1})</td>
</tr>
<tr>
<td></td>
<td></td>
<td>carboxylic acids</td>
<td>1250-1300 cm(^{-1})</td>
</tr>
<tr>
<td></td>
<td></td>
<td>esters</td>
<td>1100-1300 cm(^{-1})</td>
</tr>
</tbody>
</table>
Infra Red Spectroscopy

HOW TO USE THE INFRA RED SPECTROPHOTOMETER

1. Remove “Buck Scientific Model 500 Infra Red Spectrophotometer” dust cover.
2. Ensure spectrophotometer is plugged into Mains 240V power.
3. Switch on power at Mains.
4. Switch on spectrophotometer. Switch is at back right of unit near where the Mains power enters the back of the unit.
5. Ensure Dell laptop number “5” is plugged into Mains 240V power.
6. Switch on laptop power at Mains.
7. Switch on Dell laptop 5.
8. Whether the laptop unit is on “Standby” mode, or has just been started, and needs to be unlocked or logged on, press Control/Alt/Delete simultaneously. Then type in the Password søaps (ø is the number zero).
9. Once onto the Desktop, identify the “EZScan” icon and double click.
10. The EZScan programme will now appear. For visual aesthetics, increase the size of the window by maximising (clicking on the blue box icon on the top right off the window).
11. You will need to do a reference run on an empty sample vessel. Click on “Instrument” and select “Scan”. Scan range “Start” and “End” will be default set at 4000 and 600cm⁻¹ respectively. Do not alter these ranges. The default “File Name” will be “BUCK500”. Do not change this name for your reference sample.
12. Setting up sample (refer to Figure 1). The two spectrophotometer sample windows are placed into the Bottom Segment. The top segment is then screwed into the bottom segment sandwiching the two sample windows.
13. Once your sample vessel has been placed onto the sample rack in the spectrophotometer, (refer to Figure 4), click “OK” on the “Scan Sample” window. The screen will now start displaying data.
14. To start the scan of your Crime Scene Sample click on “Instrument” and select “Scan”. Scan range “Start” and “End” will be default set at 4000 and 600cm⁻¹ respectively. Do not alter these ranges. The default “File Name” will be “BUCK500”. Change this name to “CRIMESC”.
15. To prepare the sample vessel for the Crime Scene sample, place one of the sample test windows into the bottom segment. Next, add 20μl of Crime Scene sample by micropipette onto this window (refer to Figure 2). Now place the second window on top of the first and sandwich the windows together by screwing the top segment into the bottom segment (refer to Figure 3).
16. Once your sample vessel has been placed onto the sample rack in the spectrophotometer (refer to Figure 4), click “OK” on the “Scan Sample” window. The screen will now start displaying data. As a matter of interest on the graph, the higher the graph is, the more light that is getting through the sample. The lower the graph the less light. Less light means that the sample is absorbing the light at a given wavelength because of the bonds within the chemical structure.
17. At the completion of the scan, click “Data” then “Ratio Background”. Here you will compare the sample you have just scanned with the reference sample. The “Background File Name” is “BUCK500”. The sample filename is “CRIMESC” or any other name you originally named the Crime Scene Sample. Now click “OK”.
18. Compare the graph you are looking at on the computer screen with the graphs supplied of Methylated Spirits, Acetone, Kerosene, Mineral Turpentine, Methanol and Petrol. Whilst all these graphs may have similarities, not two samples are exactly the same. Only the Crime Scene sample will almost exactly match one of these supplied graphs.
Infra Red Spectroscopy

FIGURE 1. Items required for Spectrophotometer sample testing

Bottom Segment
Top Segment (screws into bottom)
Spectrophotometer sample windows
Micropipette

FIGURE 2. Sample is sandwiched between two spectrophotometer sample windows. Sample is added by micropipette
Infra Red Spectroscopy

FIGURE 3. The final assembly where the sample windows are in the middle of the top and bottom segments.

FIGURE 4. Placement of the spectrophotometer sample occurs on the holder located as in this photo.
Infra Red Spectroscopy

GRAPH 1. Methylated Spirits; a mixture predominantly of Ethanol (C₂H₅OH) with Methanol (CH₃OH), Isopropanol (C₃H₈O), Methyl ethyl ketone (C₄H₈O) and Methyl isobutyl ketone (C₆H₁₂O).

GRAPH 2. Acetone; CH₃COCH₃, the simplest Ketone.
Infra Red Spectroscopy

GRAPH 3. Kerosene; is a mixture of carbon chains containing 12 to 15 carbon atoms.

GRAPH 4. Mineral Turpentine; is a mineral-based replacement for the vegetable-based organic turpentine. It is a mixture of highly refined hydrocarbon distillates mainly in the C9-C16 range.
Infra Red Spectroscopy

GRAPH 5. Methanol; CH₃OH, the simplest Alcohol.

GRAPH 6. Petrol; liquid mixture consisting mostly of aliphatic hydrocarbons and enhanced with aromatic hydrocarbons toluene, benzene or iso-octane.
Infra Red Spectra; Suspects and Organic Liquid Matrix

1. Compare the graph from the Infra Red Spectrophotometer against the 6 graphs shown on the preceding three pages.

2. Identify which Organic liquid you believe the Crime Scene sample to be.

3. Go through this matrix and identify which of the suspects have the Organic liquids in their homes.

<table>
<thead>
<tr>
<th></th>
<th>Methylated Spirits</th>
<th>Acetone</th>
<th>Kerosine</th>
<th>Mineral Turpentine</th>
<th>Methanol</th>
<th>Petrol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doom Pooch</td>
<td>✔</td>
<td>✗</td>
<td>✗</td>
<td>✔</td>
<td>✗</td>
<td>✔</td>
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<tr>
<td>Pussy Willow</td>
<td>✔</td>
<td>✗</td>
<td>✔</td>
<td>✗</td>
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<td>Fluffy</td>
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<td>✔</td>
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<td>✗</td>
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<td>✗</td>
<td>✔</td>
<td>✗</td>
<td>✔</td>
</tr>
<tr>
<td>Fingers O’Malley</td>
<td>✗</td>
<td>✗</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>
COLLATION OF EVIDENCE

Match the evidence to the criminal. Use ticks ✓ to indicate a MATCH or crosses ✗ to indicate NO MATCH

<table>
<thead>
<tr>
<th>Crime scene evidence</th>
<th>Hair</th>
<th>Soil pH</th>
<th>Soil density</th>
<th>Soil visual</th>
<th>Soil carbonates</th>
<th>Powder</th>
<th>DNA</th>
<th>Fibres</th>
<th>Fingerprints</th>
<th>Infra Red Spectra</th>
<th>Foot Print</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pussywillow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Fluffy</td>
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<td></td>
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</tr>
<tr>
<td>Fingers</td>
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<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Knuckles</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doom Pooch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Internet search for answers to….
Some questions

Where does the term forensic science come from? 

What is an interrogation? What does it have to do with the Latin verb “rogare”? 

How does a polygraph test work? Is it really reliable?  

How can I become a forensic scientist?

Flinders University, Forensic Archaeology stream within the Bachelor of Archaeology degree

Flinders University, Bachelor of Technology (Forensic and Analytical Chemistry) degree
Classifying Fingerprints

The comparison of fingerprints, often those found at the setting of a crime and those of a suspect is called *Dactyloscopy*. This is from two Greek words *dactylos* ~ a finger and *skopein* ~ to view or see. Because of the uniqueness of the ridges in the skin of fingers, hands and feet, this is seen as a reliable method for identifying someone. In 1823, John Purkinje, from the University of Breslau, published a thesis outlining nine distinct fingerprint patterns. Juan Vucetich ([http://en.wikipedia.org/wiki/Juan_Vucetich](http://en.wikipedia.org/wiki/Juan_Vucetich)) perfected fingerprinting in late 19th and early 20th century.

Fingerprint classification is the technique used to assign a fingerprint to one of several specific types. There are three basic patterns called the Arch, Loop and Whorl. There are more complex systems of classification that divide the patterns to plain arches or tented arches, Radial or Ulnar Loops and several different types of whorl. Numerical schemes may also be given to the patterns depending on the detailed characteristics of the fingerprint.

The methodology of fingerprinting depends on the fact that when a person touches something with the fingers, there will usually be an oily residue left on the surface. The residue is a copy of the person's fingerprint and can be collected by a range of different methods. Traditionally, finely ground powders of chalk, talcum or carbon have been used to make fingerprints visible. The powder sticks to the fingerprint residue but not the surrounding surface. When the prints are invisible they are called "latent fingerprints". Chemical techniques such as using cyanoacrylate (superglue) fumes and ninhydrin spray can make latent fingerprints visible.
Useful websites


http://www.fingerprints.tk/

http://www.brazoria-county.com/sheriff/id/id~top.htm
APPENDIX 2: Environmental Biology/ Datalogging.

What is a Data Logger?

A data logger is an electronic device that records data over time with a built in instrument or sensor or via external instruments and sensors. They generally are small, battery powered, portable and equipped with a microprocessor, internal memory for data storage and sensors. Some data loggers interface with a personal computer and utilise software to activate the data logger and view and analyse the collected data, while others have a local interface device (keypad, LCD) and can be used as a stand-alone device.

One of the primary benefits of using data loggers is the ability to automatically collect data on a 24-hour basis. Upon activation, data loggers are typically deployed and left unattended to measure and record information for the duration of the monitoring period. This allows for a comprehensive, accurate picture of the environmental conditions being monitored, such as air temperature and relative humidity.

Applications of data logging include;

- Unattended weather station recording (such as wind speed / direction, temperature, relative humidity, solar radiation).
- Unattended hydrographic recording (such as water level, water depth, water flow, water pH, water conductivity).
- Unattended soil moisture level recording.
- Unattended gas pressure recording.
- Road traffic counting.
- Process monitoring for maintenance and troubleshooting applications.
- Wildlife research.
- Measure vibration and handling shock (drop height) environment of distribution packaging.
- Tank level monitoring.
- For science education enabling 'measurement', 'scientific investigation' and an appreciation of 'change'.


What are we doing?

We are going to have small groups look at small parts of the health of Warriparinga and bring their results back to the whole group so that we can collate the results and see the whole picture.

What sensors are we using and what do they measure?

Global Position Satellite (GPS); A device that tracks where you are in the world. The units we will use can measure your position anywhere in the world to an accuracy of 5 metres.

Geiger Müller; A sensor that measures levels of radioactivity present in the environment. Measured in counts per second (cps). Hopefully we will not see too much radiation as this would suggest radioactive waste.
**Conductivity:** A sensor that measures the cleanliness of water. Pure water is not conductive (allow electricity to pass through it). Water only becomes conductive when impurities or salts are dissolved in it. The unit of conductivity is Siemens. We would expect to see very little conductivity which means the unit is small and measured in milli Siemens (mS) or 1/1000 or a Siemen.

**Infra Red:** A sensor that measures the level of Infra Red radiation present. You can feel Infra Red radiation as it is a component of the energy and warmth you feel in sunlight. Bright sunlight provides an irradiance of about 1 kilowatt per square meter at sea level. Of this energy, 527 watts is infrared light, 445 watts is visible light, and 32 watts is ultraviolet light. The unit is Watts per square metre (W/m²).

**Humidity:** A sensor that measures the amount of moisture (% water) in the air. The higher the % of water in the air, the greater the likelihood of rain. 100% humidity usually means it is raining.

**Air Temperature, Water Temperature and Soil Temperature:** The sensors that measure the temperature of air, water and soil are the same. The only difference is what medium the temperature sensor is in. Unit of temperature in Australia is Celsius (°C) but in other countries it is Fahrenheit.

**pH:** The pH sensor is used to determine if a liquid is either acidic (like soft drink), neutral (like tap water) or alkaline (like bathroom cleaner). There is no unit for pH as it is measured on a scale from 0 to 14 with 0 highly acidic, 7 neutral and 14 highly alkaline.

**Carbon Dioxide:** The Carbon Dioxide sensor measures the parts per million (ppm) of Carbon Dioxide gas in air. Typical values for Carbon Dioxide are around 390 ppm (or 0.0390%) but globally this value is on the rise.
What sensors are we using and what do they measure? (Continued)

**Sound level:** This sensor measures the decibels (dB) of noise in the environment. This sensor will be affected by background conversations when measuring.

**Light Intensity:** A sensor that looks at how much light there is. This can vary in a matter of seconds due to clouds etc and whether the sensor is pointing at the sun or ground. Try pointing the sensor at the sun and make sure you are not in the shade when you do so. Unit of light intensity is Lux.

**Heat Flow:** A sensor that looks at whether energy is entering the sensor (hot day) or leaving the sensor (cold day). The unit is Watts per square metre (W/m²).

**Dissolved Oxygen:** Oxygen (or air) is dissolved into water. The only time oxygen is not dissolved in water is when the water is boiled (hence the bubbles). In normal circumstances the amount of oxygen in water is known. This sensor makes a comparison between how much oxygen is in the water being tested and compares it to the amount of oxygen that should be in the water. The result is recorded as a percentage (%) of oxygen that should be in the water. Warriparinga is typically 30-80% of the dissolved oxygen expected. The amount of oxygen in water can be altered by algal blooms.

**Ultra Violet:** Ultra Violet light, like Infra Red radiation is light of a specific wavelength. In the case of UV it is in a wavelength that causes our skin to burn. Bright sunlight provides an *irradiance* of about 1 kilowatt per square meter at sea level. Of this energy, 527 watts is infrared light, 445 watts is visible light, and 32 watts is ultraviolet light. The unit is Watts per square metre (W/m²).

**Turbidity:** This test does not use a sensor. It uses a tube with water in it. Turbid water is water that has lots of impurities or sediments in it which makes the water look muddied or cloudy. The units of turbidity with the tube we are using are Nephelometric Turbidity Units (NTU). The tube is used by filling completely with water and slowly pouring water out until you can see the wavy lines in the bottom of the tube. When you can see the wavy lines look to see what the nearest number on the side of the tube is.
Instructions on the use of the GPS Units

The GPS units will already be on when you want to use them and on the page “Mark Waypoint” in which you will be shown what the current elevation and GPS co-ordinates are. Co-ordinates in Warriparinga are recorded in the format:

SXXXX.XXX’ EXXXXX.XXX’

Example; Jamo’s home is S35001.562’ E138036.752’

If the GPS unit switches off, then the process to get to the page to read GPS co-ordinates can be achieved by;

1. Switching on the GPS by pushing the PWR button (on the right side of the GPS when looking at the screen).
2. Wait until the GPS links with satellites. When this has been achieved you will be able to see on the screen a distance to which the GPS is accurate. For instance 8 metres.
3. Now press the PAGE button (on the right side of the GPS when looking at the screen) until you see the MENU and options page.
4. If the screen has not highlighted MARK then use the Up and Down arrow keys (on the left side of the GPS when looking at the screen) to highlight MARK.
5. Now press ENTER (on the left side of the GPS when looking at the screen).
6. MARK WAYPOINT will now appear with the image of a person holding a flag. At the bottom of the screen are the co-ordinates that you are after.
1. You have two Data Harvest base units. The leads between the base unit and sensors are shaped so that they can only go in one way. Note that the Geiger Müller, conductivity, pH and dissolved oxygen probes also have an “adaptor” and do not plug directly into the base unit.

2. Once all the leads are plugged in, press METER, STOP and ENTER simultaneously. You will see “Easy Sense Advanced v1.5” before “Easy Log ENTER to begin”. Press the down arrow until you see METER, then press ENTER. You will now see 1) XXXXX. What XXXXX is will depend upon what sensor you put into the Number 1 port on the base unit. If you press the down arrow again you will see the value for sensors 2) through to 6) and back through 1) again.

3. Some tips for the sensors;
   (i) Ultra violet, light level, heat flow and infra red probes will give different values depending on which way they are pointing. Try to find a MAXIMUM value by turning the probes. Maximum values will also be affected if used in the shade.
   (ii) Some probes take a minute to reach a stable value. Be patient!

4. If after having read and tried these instructions, you have questions, see Jamo.
Who is measuring what?

**Group 1.** GPS Locations of test points
- Radioactivity Levels
- Infra Red Radiation
  - Water Conductivity

**Group 2.** GPS Locations of test points
- Humidity of Air
- Air Temperature
  - Water pH

**Group 3.** GPS Locations of test points
- Carbon Dioxide Concentration
- Background Sound Level
  - Water temperature

**Group 4.** GPS Locations of test points
- Light Intensity
- Heat Flow
  - Water Dissolved Oxygen Concentration

**Group 5.** GPS Locations of test points
- Ultra Violet Radiation
- Soil Temperature
  - Water Turbidity

**POSITION A:** Pedestrian Bridge. Accessed via path not shown on this map which comes past the Scar Tree.
**POSITION D:** West side of Main Lake. Accessed from the Boardwalk Gabion Weir South of this position.

**POSITION B:** Wharf. Accessed via path not shown on this map which comes past the Scar Tree. Watch for Geese and baby birds.

**POSITION C:** Boardwalk Gabion Weir. Accessed via path not shown on this map which comes past the Scar Tree or South via path past Inlet. Watch for Geese and baby birds.

**POSITION E:** Water Outlet. Accessed via path not shown on this map which comes past the Scar Tree or South via path past Inlet. Watch for Geese, baby birds and bees.

**POSITION F:** Pedestrian Bridge. Accessed via paths not shown on this map which comes past either the Kaurna War Shield tree or the LKCC.
**POSITION A:** Sturt Road Pedestrian Bridge looking West and East

<table>
<thead>
<tr>
<th>Measuring Device</th>
<th>Units</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Position System (GPS)</td>
<td>South Hours &amp; Minutes</td>
<td>....................................</td>
</tr>
<tr>
<td>Global Position System (GPS)</td>
<td>East Hours &amp; Minutes</td>
<td>....................................</td>
</tr>
<tr>
<td>Sensor 1</td>
<td></td>
<td>....................................</td>
</tr>
<tr>
<td>Sensor 2</td>
<td></td>
<td>....................................</td>
</tr>
<tr>
<td>Sensor 3</td>
<td></td>
<td>....................................</td>
</tr>
</tbody>
</table>
### POSITION B: Wharf view facing West looking left and right

<table>
<thead>
<tr>
<th>Measuring Device</th>
<th>Units</th>
<th>Value</th>
</tr>
</thead>
<tbody>
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<td>Global Position System (GPS)</td>
<td>South Hours &amp; Minutes</td>
<td></td>
</tr>
<tr>
<td>Global Position System (GPS)</td>
<td>East Hours &amp; Minutes</td>
<td></td>
</tr>
<tr>
<td>Sensor 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensor 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensor 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Position C:** Lakes pedestrian bridge looking West and East

<table>
<thead>
<tr>
<th>Measuring Device</th>
<th>Units</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Position System (GPS)</td>
<td>South Hours &amp; Minutes</td>
<td>.................................................</td>
</tr>
<tr>
<td>Global Position System (GPS)</td>
<td>East Hours &amp; Minutes</td>
<td>.................................................</td>
</tr>
<tr>
<td>Sensor 1</td>
<td></td>
<td>.................................................</td>
</tr>
<tr>
<td>Sensor 2</td>
<td></td>
<td>.................................................</td>
</tr>
<tr>
<td>Sensor 3</td>
<td></td>
<td>.................................................</td>
</tr>
</tbody>
</table>
**POSITION D:** Marion Road Looking West and East

<table>
<thead>
<tr>
<th>Measuring Device</th>
<th>Units</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Position System (GPS)</td>
<td>South Hours &amp; Minutes</td>
<td>..................................</td>
</tr>
<tr>
<td>Global Position System (GPS)</td>
<td>East Hours &amp; Minutes</td>
<td>..................................</td>
</tr>
<tr>
<td>Sensor 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensor 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensor 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**POSITION E:** Wetlands water entrance looking West and East

<table>
<thead>
<tr>
<th>Measuring Device</th>
<th>Units</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Position System (GPS)</td>
<td>South Hours &amp; Minutes</td>
<td>...........................................</td>
</tr>
<tr>
<td>Global Position System (GPS)</td>
<td>East Hours &amp; Minutes</td>
<td>...........................................</td>
</tr>
<tr>
<td>Sensor 1..........................</td>
<td>..........................</td>
<td>...........................................</td>
</tr>
<tr>
<td>Sensor 2..........................</td>
<td>..........................</td>
<td>...........................................</td>
</tr>
<tr>
<td>Sensor 3..........................</td>
<td>..........................</td>
<td>...........................................</td>
</tr>
</tbody>
</table>
POSIIION F: South Road pedestrian bridge looking West and East

<table>
<thead>
<tr>
<th>Measuring Device</th>
<th>Units</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Position System (GPS)</td>
<td>South Hours &amp; Minutes</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Global Position System (GPS)</td>
<td>East Hours &amp; Minutes</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Sensor 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensor 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensor 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTES.....
APPENDIX 3: Expert Inquiry Group Topics and guiding rubrics

Topics are available from the ASMS Server.

A: Preventative Health stream

Inquiry Topics.
These topics are structured to require-

Connection
The presentation to link back to some aspect of the ‘information delivery’ phase, and demonstrate some understanding of it (which will probably involve further Internet searching, but is clearly linked to information provided at ASMS and Kintore Avenue)

Investigation
Some further 'new' investigation(s) is undertaken to follow up on the above- maybe Internet based, maybe hands-on practical activity, maybe survey/observation based.

Recommendation(s)
Recommendation(s) on further research/ government priorities/ specific policy development initiatives/ other action to be taken by…..identified body/bodies.

Guiding Rubric.
See next page

The rubric is provided to give Expert Inquiry groups guidance to the quality of their presentations as they are in the process of developing them, as well as to assist Tutors, Mentors and Teachers in supporting Expert Inquiry Groups in their work.

Notes

* Rows 2 and 3
Participants will have participated in a workshop focused on assessing and identifying websites

**Row 3:
Score in row 3 is moderated by the score in row 2.
Row 3 score X row 2 score/ 4, rounded

***Row 5:
Scores for rows 5a – 5f averaged for overall score.
## Preventative Health guiding rubric

<table>
<thead>
<tr>
<th>Criteria/classification</th>
<th>Expert 4 marks</th>
<th>Good 3 marks</th>
<th>Elementary 2 marks</th>
<th>Beginning 1 mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Addressing research question components from above 1 Connection 2. Investigation 3. Recommendation(s)</td>
<td>All aspects covered thoroughly</td>
<td>Most aspects addressed thoroughly</td>
<td>Most aspects addressed</td>
</tr>
<tr>
<td>2</td>
<td>Number of external sources properly identified</td>
<td>More than 10 sources identified see notes</td>
<td>7 – 10 sources identified</td>
<td>4 – 6 sources identified</td>
</tr>
</tbody>
</table>
| 3                       | Quality of external sources.

** score moderated-see notes | Clear evidence that all sources have been checked for bias and credibility | Approx 75% check rate for bias and credibility | Approx 50% check rate for bias and credibility | No evidence of checking for bias or credibility |
| 4                       | Evidence of quality participation by all team members | All members participating equally, clear evidence of collaboration | Work being shared fairly equally, some evidence of collaboration. | Some evidence of work being shared | One member responsible for all the work |
| 5                       | Quality presentation preparation *** see notes | | | | |
| 5a                      | Number of slides | 10 or less slides | 11 – 15 slides | 16 – 24 slides | 25 slides or more |
| 5b                      | Number of words per slide | 15 or less words per slide | 16 – 19 words on most slides | 20 – 24 words on most slides | 25 or more words on most slides |
| 5c                      | Font size on slides | Font size 25 or greater on all slides | Font size 20 – 24 on most slides | Font size 16 – 19 on most slides | Font size 15 or smaller on most slides |
| 5d                      | Use of graphics | Clear, appropriate graphics used | Some graphics used- appropriateness questionable | No, or inappropriate graphics | No graphics |
| 5e                      | Use of props | 2 or more appropriate props | 2 appropriate or more than 2, not all appropriate | 1 appropriate or 2 inappropriate props used | No props used |
| 5f                      | Demonstrated understanding of content | Can explain slides confidently, without notes | Can explain slides confidently, using notes | Unclear, hesitant explanation of slides, with or without notes | Reading directly from slides, no further explanations |
| 6                       | Overall classification | Expert 17 – 20 total marks | Good 12 – 16 total marks | Elementary 7 – 12 total marks | Beginning 5 – 6 total marks |
**B: Nanotechnology stream**

These topics will be structured such that successful presentations will include:

**Investigation report**
A clear description of the main activities undertaken and outcomes derived.

**Nanotechnology**
Evidence in the Investigation report of participants’ understanding of the science involved in the Nanotechnology underpinning their investigation.

**Extension**
*Investigative.*
Evidence of the group having, in a planned manner, worked beyond the direct procedures provided to explore and report on the science involved.

**Applications**
Evidence of the group having researched existing applications of the Nanotechnology in question and proposing and justifying realistic new applications.

**Guiding Rubric.**
See next page

The rubric is provided to give Expert Inquiry groups guidance to the quality of their presentations as they are in the process of developing them, as well as to assist Tutors, Mentors and Teachers in supporting Expert Inquiry Groups in their work.

**Notes**

* **Row 3**
Participants will have participated in a workshop focused on assessing and identifying websites

**Row 5:**
Scores for rows 5a – 5f averaged for overall score.
### Nanotechnology guiding rubric

<table>
<thead>
<tr>
<th>Criteria/classification</th>
<th>Expert 4 marks</th>
<th>Good 3 marks</th>
<th>Elementary 2 marks</th>
<th>Beginning 1 mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Report. 1.Clear description 2. Science understood</td>
<td>All aspects covered thoroughly</td>
<td>Most aspects addressed thoroughly</td>
<td>Most aspects addressed</td>
<td>Little evidence of focus on the question.</td>
</tr>
<tr>
<td>2 Extension Investigative or applications</td>
<td>Extension activities clearly reported on and thoroughly referenced</td>
<td>Extension activities attempted; reporting superficial or referencing inadequate.</td>
<td>Extension activities attempted, reporting superficial and referencing inadequate.</td>
<td>No evidence of extension activities</td>
</tr>
<tr>
<td>3 Quality of external sources * see notes</td>
<td>Clear evidence that all sources have been checked for bias and credibility</td>
<td>Approx 75% check rate for bias and credibility</td>
<td>Approx 50% check rate for bias and credibility</td>
<td>No evidence of checking for bias or credibility</td>
</tr>
<tr>
<td>4 Evidence of quality participation by all team members</td>
<td>All members participating equally, clear evidence of collaboration</td>
<td>Work being shared fairly equally, some evidence of collaboration.</td>
<td>Some evidence of work being shared</td>
<td>One member responsible for all the work</td>
</tr>
<tr>
<td>5 Quality presentation preparation ** see notes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5a Number of slides</td>
<td>10 or less slides</td>
<td>11 – 15 slides</td>
<td>16 – 24 slides</td>
<td>25 slides or more</td>
</tr>
<tr>
<td>5b Number of words per slide</td>
<td>15 or less words per slide</td>
<td>16 – 19 words on most slides</td>
<td>20 – 24 words on most slides</td>
<td>25 or more words on most slides</td>
</tr>
<tr>
<td>5c Font size on slides</td>
<td>Font size 25 or greater on all slides</td>
<td>Font size 20 – 24 on most slides</td>
<td>Font size 16 – 19 on most slides</td>
<td>Font size 15 or smaller on most slides</td>
</tr>
<tr>
<td>5d Use of graphics</td>
<td>Clear, appropriate graphics used</td>
<td>Some graphics used-appropriateness questionable</td>
<td>No, or inappropriate graphics</td>
<td>No graphics</td>
</tr>
<tr>
<td>5e Use of props</td>
<td>2 or more appropriate props</td>
<td>2 appropriate or more than 2, not all appropriate</td>
<td>1 appropriate or 2 inappropriate props used</td>
<td>No props used</td>
</tr>
<tr>
<td>5f Demonstrated understanding of content</td>
<td>Can explain slides confidently, without notes</td>
<td>Can explain slides confidently, using notes</td>
<td>Unclear, hesitant explanation of slides, with or without notes</td>
<td>Reading directly from slides, no further explanations</td>
</tr>
<tr>
<td>6 Overall classification</td>
<td>Expert 17 – 20 total marks</td>
<td>Good 12 – 16 total marks</td>
<td>Elementary 8 – 12 total marks</td>
<td>Beginning 5 – 7 total marks</td>
</tr>
</tbody>
</table>
APPENDIX 4: Nanotechnology and Preventative Health materials

Nanotechnology and Preventative Health Expert Inquiry Group materials are provided online at ASMS.

Some other material is too - other material will be provided in particular sessions.
APPENDIX 5: ASSETS USE OF ASMS SPACE.

The initial welcome and the final presentations will utilise the downstairs Lower Learning Common at ASMS – which is just below Learning Common 3 on page 70.

For the remainder of the program time spent at ASMS, the participants will use Studios 7, 8 & 9 (Studio 8/9 is the laboratory), and Learning Commons 7, 8 & 9, shown on page 71.

It is important to not wander into or use other spaces because ASMS staff are likely to be busy re-arranging, cleaning and otherwise preparing these areas for the start of the 2011 year.