AVIATION STUDIES: STEM STRATEGY SACE

GLENUNGA INTERNATIONAL HIGH

STEM – It is about context

- "After considering the advantages and disadvantages of integrated approaches to STEM education, it is reasonable to review the levels, subjects and approaches you think are best for your situation. **There is no single best approach to STEM** education. Different approaches have their advantages and disadvantages .....You might consider an approach that maintains the best of both a discipline-based program and some form of an integrated STEM curriculum."

Rodger Bybee from the CASE for STEM EDUCATION

Developing a Plan for Your Context

- Bybee's Advice

Step One

- Strengthen and improve the traditional STEM disciplines. Strengthen Technology and Engineering.
- Within the STEM disciplines, find places to coordinate, complement, correlate and connect to the disciplines.

Step Two

- Proposing integrated courses that address the core ideas and practices of disciplines.
- Develop integrated units within the current curriculum structure.

What is the Glenunga Context?

- School Improvement 2008 to 2016 school data
- Focus on Pedagogical Improvement
- Period of intensive change – still in the churn
- Focus on Pedagogical Improvement through Task Design and connection with student and staff wellbeing

Change Leadership and Strategic Thinking

- **What does a Glenunga version of STEM look like?**
- **Impetus for change in this area?**
- **Destination Data – high number of students entering engineering, maths and science and technology, medicine, pharmacy, dentistry**
- **Conservative parents – easily startled**

Retention in Science and Maths

Maths	No of Classes
Yr 8	15
Yr 9	12
Yr 10	15
Yr 11	19
Yr 12	12
	73
Science	
Sem 1 Classes	No of Classes
Yr 8	15
Yr 9	13
Yr 10	21
Yr 11	23
Yr 12	21
	93

Year 10 Science Choices

- Students can choose 4 semesters of Science
- IGNITE – do 3 years of science in 2
- Students complete AC science in 2 .5 years

Semester	Students
1	22
2	141
3	139
4	72

Transdisciplinary Approach

- **Focus on 21st Century Learning and the 4 Cs – Communication, Collaboration, Creative Thinking and Critical Thinking**
- **Transdisciplinary thinking**
- **Skills and Dispositions that cross all learning areas**
- **Emphasis on Problem Solving and Far Transfer**

STEM THINKING/LITERACY

- Knowledge, attitudes and skills to identify questions and problems in life situations, explain the natural and designed world and draw evidence based conclusions about STEM related issues
- Understanding of the characteristics and features of STEM disciplines as forms of human knowledge, inquiry and design
- Awareness of how STEM related disciplines shape our material, intellectual and cultural environments
- Willingness to engage in STEM related issues and with the ideas of science, technology, engineering and mathematics as a constructive, concerned and reflective citizen.
- Computational Thinking, Inquiry, Data analysis, Coding etc

Our Plan

- Stages over 3 years
- Appointment of a STEM Senior Leader Maths and Technology
- Strengthen the Existing Structure
- Find opportunities to explore inter disciplinary curriculum with real world applications in Science, Technology and Maths
- Re develop the Technologies courses to focus on problem based learning
- Explore how we can use thinking from one learning area to inform that of another
- Introduce SACE Stage 1 and 2 Nutrition
- Explore within the flexibility of the SACE - Aviation Studies – SACE Stage 2 Scientific Studies or VET Certificate 3?

Stage 2

STEM focus: Problem Based Learning

- **Year 8 and 9: Collaborative problem solving over 2 weeks in teams. Not subject area specific and real world problems to solve.**

- **Semester subjects at Year 10 focusing on Entrepreneurial Skills and collaborative problem solving**

Stage 3

- **Shared thinking across Learning Areas**
- **Computational**
- **Scientific method**
- **Use of technology including coding**

Table Talk

What is the context of STEM in your school?

How will your curriculum architecture have to change?

Will the implementation of STEM result in a change of pedagogy? How?

What is your plan for implementing STEM?

Scientific Studies

Scientific Studies

- Scientific Studies is a 10-credit subject or a 20-credit subject at Stage 1, and a 10-credit subject or a 20-credit subject at Stage 2.
- Scientific Studies has a subject outline that is designed to give schools additional flexibility in developing Stage 1 and Stage 2 teaching and learning programs that focus on specific local needs and interests.

Aviation studies (Scientific Studies)

- Students develop their knowledge of scientific principles and concepts, the ability to use that knowledge to identify questions, issues, opportunities and challenges, and the capacity to acquire new knowledge through their own investigations.
- They develop the skills and abilities to explain scientific phenomena, and to draw evidence-based conclusions from the investigation of science-related issues. In this way, students develop scientific knowledge and skills to support them in their future career pathways, including those that are science-related, and everyday life in a world shaped by science and technology.

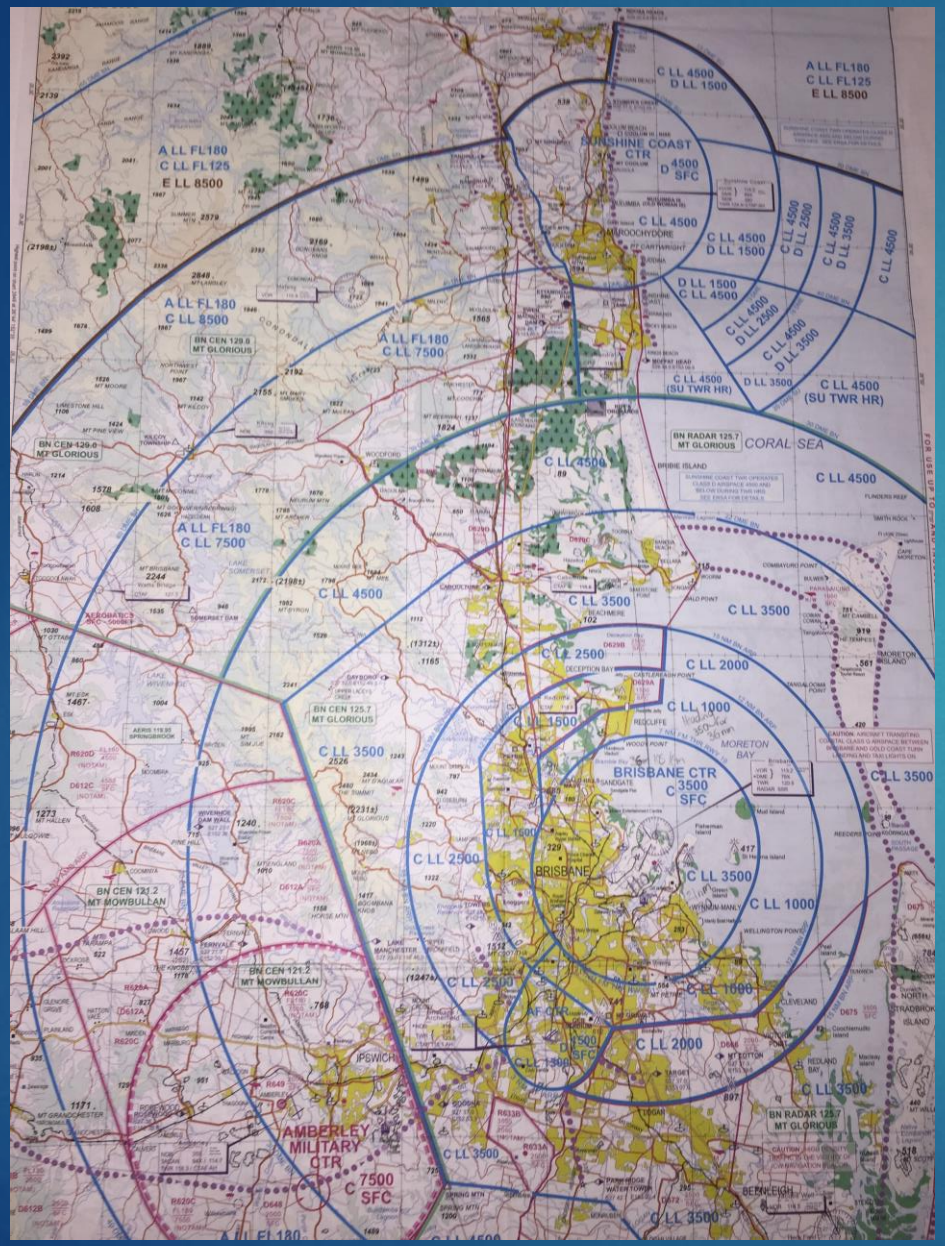
Assessment

- **School Assessment (70%)**
- Assessment Type 1: Investigations Folio (40%)
- Assessment Type 2: Skills and Applications Tasks (30%)
- **External Assessment (30%)**
- Assessment Type 3: Practical Investigation (30%).

CASA RPL Theory Exam

Transdisciplinary Skills

- Aviation studies is designed to draw on a range of subject matter
- Mathematics
- Physiology
- Meteorology
- Physics
- Geography
- Psychology
- Literacy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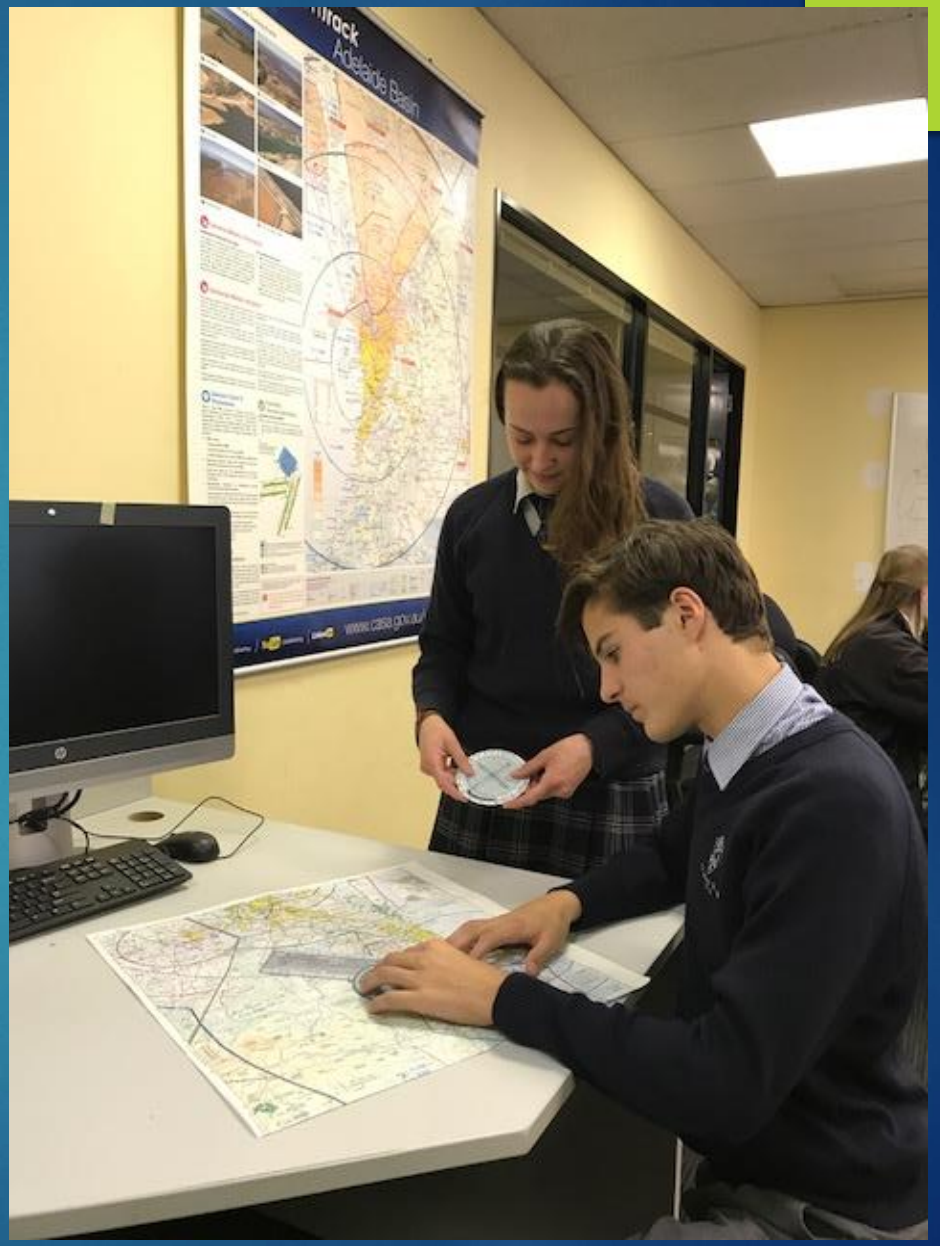
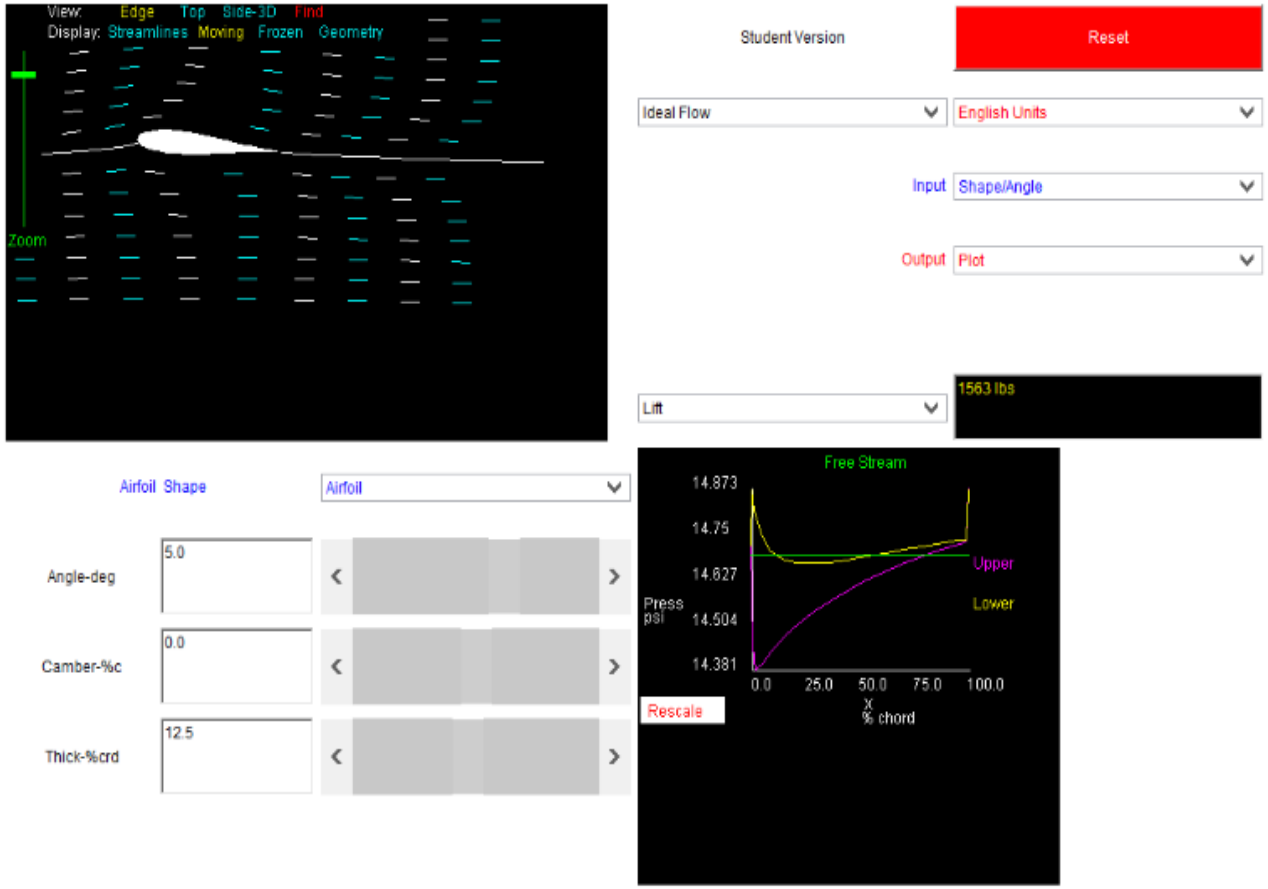

Adelaide Basin

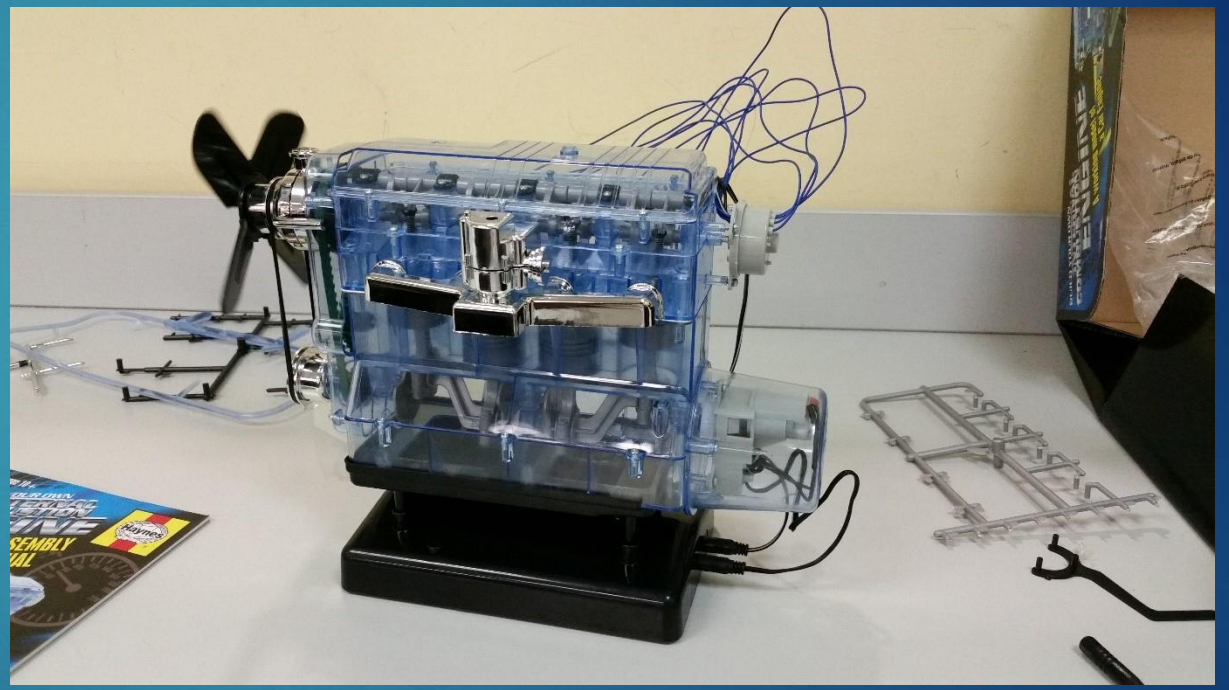


FoilSim II

With this software you can investigate how an aircraft wing produces lift by changing the values of different factors that affect lift.

There are several different versions of FoilSim II which require different levels of experience with the package, knowledge of aerodynamics, and computer technology. This web page contains the off-line student version of the program. It includes an off-line user's manual which describes the various options available in the program. More experienced users can select a version of the program which does not include these instructions and loads faster on your computer.


2:48
INTERNAL COMBUSTION
ENGINE


Haynes

Problem based learning

- Students develop their skills throughout the course
- PBL is incorporated as students progress
- Culminates in a real life scenario

VFR Flight Planning – Flight Information

Route **(Map required VTC/VNC Adelaide)**

1. YMBD (departure airport)
2. YPPF
3. TANANDU (Surveying this location - total time 45mins)
4. YREN (destination airport)

Aircraft loading

Front seats (FPAX): pilot and passenger (assume 85kg for each)

Rear passengers (RPAX): one passenger (assume 85kg)

Baggage area 1 (BAGGAGE 1): atmospheric physics equipment (15 kg)

Baggage area 2 (BAGGAGE 2): nothing

Fuel on board: **194 L**

Flight conditions:

- Departure at 2330Z on 22/02/2017
- Assume clearance through CTA will be delivered (though not necessarily for PRD areas)
- True airspeed is 110 knots
- Climbing costs 1 extra minute for every thousand feet of climb. You don't get this back when you descend.
- Arriving or departing from an aerodrome costs 2 extra minutes. This includes a climb to 1500 feet (on departure).
- Fuel consumption is 34 L per hour
- Start-up and taxi costs 4kg of fuel (as indicated on load sheet)

Take-off and landing performance

Take-off distance required at MTOW, for dry, level, paved surface, nil wind: 1850 feet

- Decrease distance by 10% for each 9 knots of headwind
- Increase distance by 10% for each 2 knots of tailwind (maximum 10 knots)
- For operations on dry, grass runway, increase distance by 15%

WEATHER INFORMATION

AREA50 (50)
AREA QNH 22/01
AREA 50: 1019

AMEND AREA FORECAST 221655 TO 230800 AREA 50.

AMD OVERVIEW:
ISOLATED SHOWERS S OF YPLC/YGWA/YMTG, EXTENDING FROM 22Z TO BE S OF YCEE/YARS/YADG/YMBD/YLAO AT 00Z, THEN CONTRACTING TO S OF YPLC/YGWA/YMTG BY 04Z. BROKEN LOW CLOUD S OF BUNGY/YKIG/YNRC, CONTRACTING SE OF CRAY/YMTG BY 22Z AND CLEAR BY 00Z.

SUBDIVISIONS:
A: N OF CANDY/YNRC.
B: S OF CANDY/YNRC BEFORE 22Z.
C: S OF CANDY/YNRC AFTER 22Z.

WIND:
2000 5000 7000 10000

Other Themes:
The importance of science in contemporary Australia

- Topics
  - Climate change
  - Food technologies
  - Water conservation
  - Recycling
  - Transport
  - Air quality
  - Sustainability
  - Resources
  - Carbon trading
  - Pollution
  - Wind farms

Table talk

- How are you implementing STEM at your site in the SACE?
- In your context, what opportunities does Scientific Studies offer your site?
- Are there other subjects being used that provide flexibility in the SACE?