ACTIVE AND COLLABORATIVE LEARNING IN AN IT-ENHANCED INTERACTIVE CLASSROOM

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Towards 21st-Century Science

- Multidisciplinary
  Alternative energy, Earth science, medical physics...
- Collaborative work
- Technology-driven
  Modeling, simulation, communication etc.

Special Programme in Science

- Integrated modules with thematic approach.
- Team teaching and peer learning. Student mentorship.
- Computing with Mathematica™. Acquisition and development of IT infrastructure for teaching and learning.
# Integrated Science Curriculum

<table>
<thead>
<tr>
<th>Year of Study</th>
<th>Semester 1</th>
<th>Semester 2</th>
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<tr>
<td>1 (Freshmen)</td>
<td>Atoms to Molecules</td>
<td>The Cell</td>
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<td></td>
<td>Discovering Science</td>
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<td>2 (Sophomore)</td>
<td>The Earth</td>
<td>The Universe</td>
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<td></td>
<td>Integrated Science Project</td>
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<tr>
<td>3</td>
<td>Junior mentorship (or join overseas programme)</td>
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<tr>
<td>4 (Honors)</td>
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<td>Senior mentorship</td>
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The Classroom

- 40’ LCD monitor
- Document camera
- VGA cables and power sockets for laptops

Students seated in groups of 5 (±1).

Students choose a card as they enter to determine their seats

IT-connected clusters

Centrally controlled by lecturer

White board | Projector screen | White board
How Active Learning is implemented

• Almost half of the lecture dedicated for problem solving.
• Problems are usually given in the midst of introducing a new concept.
• Students are given 5-10 minutes to discuss within the group.
• A group is randomly chosen to present the answer from their table.
A lecture problem:

Ex. Reason that the cosmological principle\(^1\) implies that any observer looking at the motion of galaxies will find the radial velocities proportional to the distance between her and the galaxy.

\[10 + 5 \text{ min}\]

\(^1\)The cosmological principle: The Universe is homogeneous and isotropic.
A lecture problem:

Ex. What does the Friedmann equations

\[
\frac{\dot{S}(t) + kc^2}{S(t)} = \frac{8}{3}\pi G \rho(t)
\]

and

\[
\ddot{S}(t) = -\frac{4}{3}\pi G \rho(t) S(t)
\]
tell us about our Universe?

[6 + 4 min]
(It was a) Challenge

• Lack of time to deliver lecture content.
  - Full comprehensive lecture notes (in pdf) were given to students before classes.
  - Students were to self-learn part of the content.
  - Lecture on the assumption that students are familiar with some fundamental knowledge of the content.
The seating arrangement in the ALSR facilitates small group discussions.

Discussions of lecture exercises in groups enabled more effective learning for me and my peers.

The IT/media facilities in the ALSR are utilised by the students.

The IT/media facilities in the ALSR are useful for discussions and presentations.

SD: Strongly Disagree  D: Disagree
SA: Strongly Agree      A: Agree
The IT/media facilities in the ALSR are user-friendly.

The IT/media enhances the effectiveness of group learning and presentation.

Overall, I find the learning experience in the ALSR a pleasant one.

I will like to have more lectures held in the ALSR.

SD: Strongly Disagree  D: Disagree  SA: Strongly Agree  A: Agree
Recent Progress and New Challenges

• An interactive e-lecture notes.

• Group behaviour/dynamics.

• A slight case of depression.
Active Learning Classrooms in NUS

• Total of 15 Active Learning Classrooms across NUS.

http://blog.nus.edu.sg/citations/tag/active-learning-classroom/
Conclusion
SPS Staff Team

Dr. Adrian M. Lee  
(Director)

Mr. Andreas Dewanto  
(Assistant Director)

Dr. Chammika Udalagama  
(Atoms to Molecule)

Dr. Leslie Gapter  
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Dr. Linda Sellou  
(The Earth)

Dr. Lim Zhi Han  
(The Universe)