

Nuclear Content in Alberta Grade 12 Science Education

Leon Lau

LHLAU@CBE.AB.CA

Nuclear Education
Outreach 2010

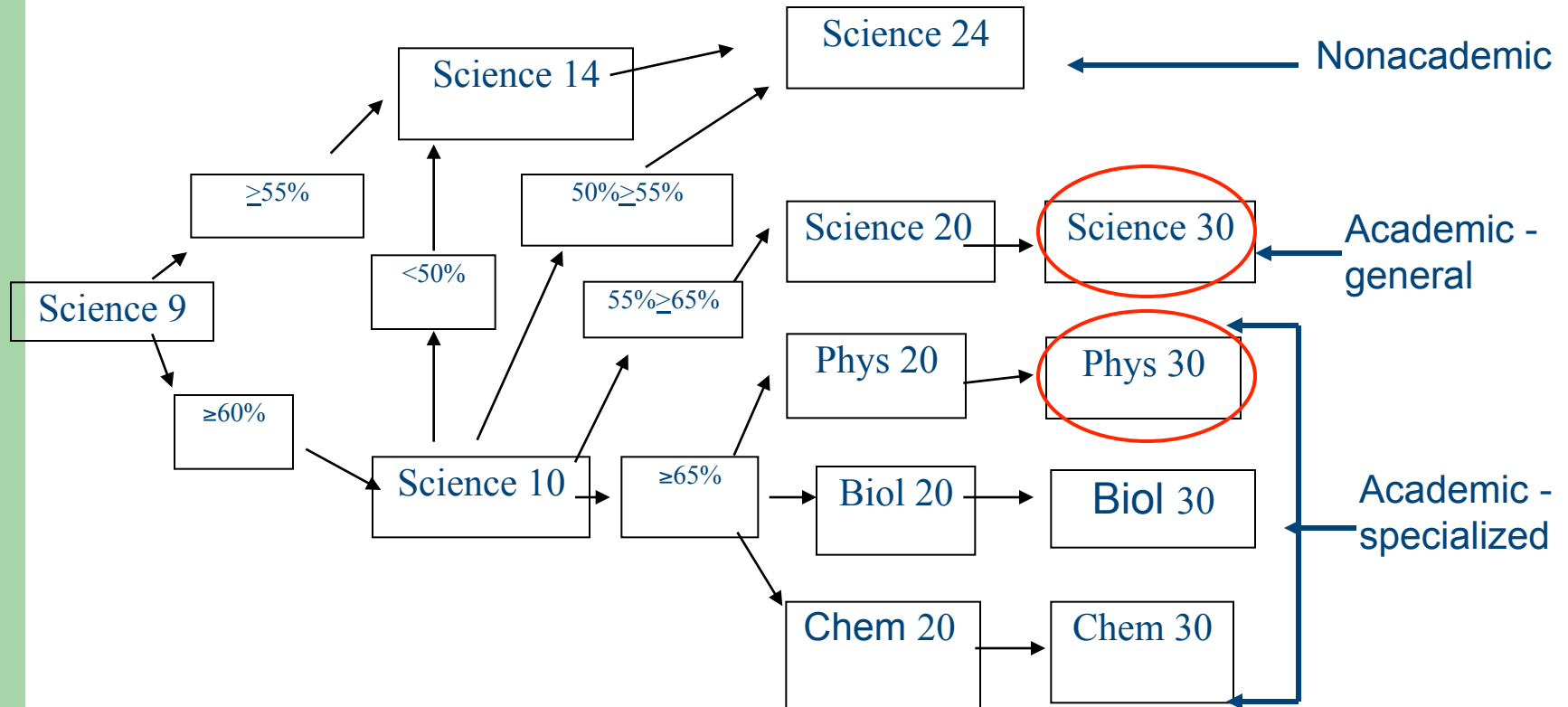
June 22 Calgary AB

Agenda

- Science Education streams in Alberta high schools
- Abilities and background of students
- Nuclear content in Science 30 and Physics 30
- Environmental Sustainability (Science 30)
- Community Involvement

Science Streams

- Grade 10: two streams
- Grade 11 and 12: three streams



Students' background

- Science 30

- Headed for non-science post-secondary studies
- If enrolled in other science courses, usually Biology 30
- Weak to moderate math & abstract skills
- Very low enrolment (45 of 500 students)

- Physics 30

- Headed for math/science post-secondary studies
- Usually take other (or all) academic specialized courses
- Moderate to strong math & abstract skills
- Low enrolment (150 of 500 students)

Course description

- Science 30
 - Chemistry, Biology, physics (Fields, Circuits, EMR) and Energy (Renewable and non-renewable)
 - General, brief coverage
 - Many links to everyday applications
- Physics 30
 - Momentum, Fields, EMR, Atomic Physics
 - History of theories, key experiments, development of formulas
 - Little links to everyday application

Science 30 Nuclear Content

- Emission and absorption spectra (in analyzing gases in stars)
- Alpha, beta, and gamma decay
 - Balanced nuclear equations
 - Fission and fusion
 - Chain rxn, CANDU, moderator
 - $E = mc^2$ (no formula rearrangement)

Science 30 Nuclear Content

- Nuclear energy as sustainable energy
 - Ecological, Economical, and societal impact of all energy sources
 - Nuclear waste management
 - “Dreams” of cold fusion

Physics 30 nuclear content

- History of the atomic theory, models and corresponding experiments
- Emission and absorption spectrum
- Binding energy, mass defect, $E = mc^2$,
- Alpha, beta, and gamma decay
 - Includes formula rearrangement!
 - Discussion on neutrino, strong and weak nuclear forces,

Physics 30 nuclear content

- Radioactive hazards and measurements
- Decay series, rates, and application
 - E.g. irradiation, industrial measurements
- Fission and Fusion
- Nuclear research
 - Synchrotrons, Standard Model

Community Involvement

- A “Homer Simpson”
 - Nuclear safety
 - Planning
- Nuclear scientist, radio-physician
- Urban planner
- Electrical engineer (efficiency in Science 30)