The Stream B Active Learning project in the Department of Physics

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Overview of the active learning project

Stream B proposals

- Physics submitted five Stream B projects in spring 2018
- Asked to amalgamate. One became the Strengthening Learning Communities, the other became Opportunities for Active Learning.
- The active learning project can broadly be thought of as split into components involving (a) blended learning, and, (b) demonstrations in the Physics degree
- Not all gone according to plan (personnel changes, pandemic and other stuff). But that’s ok!
Prior to the project

- Certainly not new though missing a unified approach
- But we are quite traditional, and students tend to like that
- Years 1 and 2 is nearly all core, years 3 and 4 nearly all options
- A few notable examples brought into lecture course, notably Physics of the Universe and Atomic Physics
- Many attempts in other forums, notably tutorials. Mixed success (for me at least!).
Blended learning within the project so far

Positive so far

• Creation and evaluation of online activities prior to scheduled contact hours

• Masoud Seifikar working with lecturers and students

• One key conclusion thus far is that pre-reading plus quizzes as a gateway before getting to online lectures this years is working well regarding students immersion in, and enjoyment of the material
Core Physics seminars as an exemplar of a natural blended learning environment

Using the newly refurbished lecture theatre

• The Physics seminars in years 1 and 2 are excellent teaching environments to use blended learning
Concept maps of topics in the Oscillations & Waves modules

Electronic Circuits

- Voltage
- Current
- Resistance
- Capacitance
- Inductance
- Sources
- Loads
- Filters
- RC Circuits
- RLC Circuits

Circuit Analysis

- Ohm's Law
- Voltage
- Current
- Power

Analyze AC Circuits

- AC Bode Plots
- Filter Analysis
- Resonance
- Nonlinear

Base Electronics

- Transistors
- Diodes
- Operational Amplifiers (Op Amps)

Analyze and Design Electronic Circuits

- PLLs
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Appendix A: Basic Concepts

- Capacitive
- Inductive
- Resistive
- Ohm's Law
- Voltage
- Current
- Power

Appendix B: Advanced Topics

- High-Pass Filters
- Low-Pass Filters
- Band-Pass Filters
- Band-Stop Filters

Appendix C: Design Examples

- Basic Amplifiers
- Power Amplifiers
- Feedback Circuits

Appendix D: Reference Materials

- Electronic Circuit Design
- Analog Electronics
- Digital Electronics

Appendix E: Glossary

- Components
- Parameters
- Equations
- Theory

Appendix F: Further Reading

- Electronic Circuit Design Theory
- Analog Electronics
- Digital Electronics

Appendix G: Additional Resources

- Online Courses
- Textbooks
- Articles
- Websites
Upcoming project work on blended learning

The next 2 years and beyond

- Further investigation of certain core courses regarding blended learning
- Careful look at how year 1 and year 2 have progressed during this year
- Masoud is running a UROP projects also looking at years 3 and 4 with extra funding from the department: “Student’s perspective on hybrid (multi-mode) teaching and learning during the Covid-19 pandemic”
- Particular inspection on student progress on courses where there has been no examinable component and how student have fared over the last two years