Modularisation of APSC180 Statics for delivery during terms of different durations (winter 1, regular summer, Vantage summer) and to suit students with diverse prior knowledge

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Introduction
Currently APSC180 Statics is offered in three different terms: Winter 1, Vantage and regular Summers. The durations are 13, 8 and 6 weeks respectively. This project aims to modularise the course into a number of lessons that collectively cover the syllabus.

The students in these three terms have a diverse background. By modularising the course, both students and instructors can decide which parts of the course to spend more time on. However, to cater to those whose learning needs are different from their classmates including those in PHY112 Introduction to Physics for the Life Sciences I with no prior physics background, this project also aims to develop media and teaching materials for automated delivery and self-learning.

The structure of each module has been drawn up following the recommendations of a paper on blended delivery of a Statics course, Proceedings of the American Society for Engineering Education. The recommendations are: 1) length of media should be approximately 10 minutes, 2) students are given time in class to work on problems, 3) bringing in real-life applications during class time, 4) having regular online assessments.

Due to the pandemic, this structure was first fully implemented in the 2021 Winter 1 term. A slight change from the original structure is that the step 1 media was shown in class instead of being watched prior to class.

Student Feedback - Positive
The following are a selection of positive feedback from the 2021 W1 Student Experience of Instruction survey.
- Dr. Goh provides great visual explanations, using real life objects, animations, and images.

The Original Structure of a Typical Module
This is the suggested method of teaching a module. However, it is not intended to be overly rigid, and variations are possible at the discretion of the instructor.

<table>
<thead>
<tr>
<th>Step</th>
<th>Whole Class</th>
<th>Individual Student</th>
<th>Instructor</th>
<th>Reference</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N.A.</td>
<td>Watch media, (introductory content).</td>
<td>N.A.</td>
<td>Prior to class</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>N.A.</td>
<td>Receive poll results, reflect on his/her perception compared to the rest of the class.</td>
<td>Comment on pre-lesson poll/survey result</td>
<td>10 – 20 min</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>N.A.</td>
<td>Continue to watch media explaining the more complex details of the theory, followed by a worked example.</td>
<td>Answer conceptual questions</td>
<td>Pause at critical points in the media for conceptual questions. Comment on result and clarify misconceptions.</td>
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</tr>
<tr>
<td>4</td>
<td>N.A.</td>
<td>Solve computerised question which is the same/ substantially similar to worked example.</td>
<td>Walk around to answer questions. Post questions and answers on discussion board.</td>
<td>Walk around to answer questions.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>N.A.</td>
<td>Media of step 3 can be replayed on individual computers for reference.</td>
<td>Walk around to answer questions. Post questions and answers on discussion board.</td>
<td>30 – 40 min</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>N.A.</td>
<td>Optional: Watch media explaining more advanced knowledge.</td>
<td>Optional: Questions at higher level of difficulty for the faster students</td>
<td>Walk around to answer questions. Post questions and answers on discussion board.</td>
<td>Optional</td>
</tr>
<tr>
<td>8</td>
<td>N.A.</td>
<td>Watch the solving of problem. Take notes, copy or solve along if desired.</td>
<td>N.A.</td>
<td>Solve a more complex problem on document camera. Emphasise strategy, breakdown into manageable steps, etc.</td>
<td>20 – 30 min</td>
</tr>
</tbody>
</table>


Student Feedback - Negative
A selection of negative feedback are:
- Less computer instruction, and more in–class learning.
- Eliminate the step 1 media and just teach it instead considering we are sitting in the lecture hall all together.
- The videos are a very poor choice for teaching. I feel that I didn’t learn anything from them and don’t feel like I learned anything in this course.

Student Suggestions
- I often found that the easy stuff that was shown in the video took too much of the time leaving not enough time for the more complicated questions, forcing these to often be rushed.
- I believe that the media segments at the beginning of the lecture could be done on our own time, leaving us more time in class to look over other examples.
- This course could be improved by involving more real life demonstrations. While it may be difficult to accomplish, actually seeing some of these concepts in action may go a long way in benefit the learning of the average student.

References

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