TEACHING SESSION PLAN

Module: Materials Science and Processes	**Level / Stage (6,7,8)** **8** **Year: 1-2**

Title of session/ topic: Exam Preparation

Length of session: 1 hour

Mark the type of session:

Lecture X **Tutorial ☐** **Lab ☐** **Studio ☐** **Workshop ☐**

Module Outcome (What module outcome(s) is the class/session aligned to)**:**

Outcome 1 – atomic bonding

Outcome 2 – structure of materials

Outcome 3 – microstructure and imperfections

Outcome 4 – diffusion

Outcome 5 – phase diagrams, mixtures, solutions

Outcome 6 – mechanical properties of materials

Outcome 7 – failure mechanisms and corrosion

Outcome 8 – processing techniques (polymers, metals, ceramics)

Class/Session Outcomes: Upon completion of this session, you should be able to: (Share with students e.g. Write on board /slide/ project image at beginning of lecture for students)

1. Draw diagrams of different types of atomic bonds and structures
2. Interpret and create vector diagrams of microstructures
3. Calculate diffusion time necessary for case hardening steels
4. Identify different phases and their quantities using phase diagrams
5. Design components to withstand certain applied stresses and strains based on material dimensions and material stiffness
6. Sketch and label a typical stress-strain loading curve for a ductile and brittle material

Select & Prioritise Your Content:

For the session, decide what material is used in class and what material the students should study independently and/or online. To do this, think about the material and its relative importance and prioritise and list in the appropriate quadrant.

	In class / live (online) Support Learning	Independent Learning (student completes)
Priority (need to know)	This lesson is a recap of important sections of the module. Problem based which are similar to exam questions are worked through. The lesson is usually done in class which leads to a lot of question and answer. Unfortunately this could not be done this year so the class is delivered online with a discussion forum also available for question and answer over the weeks preceding the exam	Student should have attempted to complete many similar examples both in class and at home throughout the year
Supplementary (nice to know)	Theory is not covered extensively but is recapped briefly.	Theory must be learned for completion of exams

Material in quadrants 1 and 3 typically become the focus during classes. Quadrants 2 and 4 represent material students could study themselves and use the VLE/Moodle and online learning objects to support this learning.

Think about how you might incorporate *Technology Enhanced Learning Tools and Blended Online/Digital Learning Objects,* that will develop students learning and engagement with the module.

Time	Teacher Activity	Student Activity	Resource Used
0-5 min	Explain to students what the lesson will entail – what the learning outcomes will be, what they will be able to do by the end of the session.	Listening	
5-55 min	Work through sample questions on powerpoint	Listening, note taking, saving questions for later	"Materials_Exam_Prep_2020" powerpoint slideshow with audio
After lesson	Powerpoint show is uploaded to moodle for students to view / review in their own time. Discussion forum directly related to exam preparation is set up on moodle for students to discuss problems / queries with teacher and / or each other	Practising sample questions, discussing / asking questions online	Moodle discussion forums

Note digital student engagement tools required for this session/lesson:

Powerpoint presentation is pre-recorded and uploaded to moodle. Students can play, pause, rewatch etc. at their own leisure. A discussion forum is set up alongside the presentation for student-teacher interaction in the weeks preceding the exam. Although not ideal (a classroom would be better for teacher-student interaction), the powerpoint show does allow students to watch and rewatch as they practice working on similar problems (which is encouraged throughout).

Teacher Reflection:

What worked well?

This lesson is very focussed on the cognitive learning domain. Throughout the semester doing this module, various techniques have been employed to engage affective and psychomotor domains to aid learning as much as possible. The skills and knowledge learned throughout the year is now put into practice to solve practical problem-based exam style questions necessary to ensure the learning outcomes of this module syllabus have been achieved by the learners.

This lesson is usually carried out towards the end of the year (in the last week of the semester) but I have created this resource a little early this year to allow students who are studying from home to catch up and recap on what we have covered so far this year. Based on initial feedback, students have found this helpful in so far as they can practice working on the problems covered here, and practice on similar ones in their own time by playing, pausing and rewinding / rewatching as they work at home. This shows that perhaps a similar resource may be helpful in the future, as carrying this out in the classroom environment face to face (while allowing for questions on the spot) may not be the best approach. If students struggle or forget some of the steps covered there is usually no chance for a recap (unless they approach or contact me directly). In future, I will be making similar resources (perhaps 1-2 recorded slide shows per section / learning outcome) that students can peruse at their leisure

What did not work well?

As this was my first attempt at recording a slideshow with audio, I struggled at the beginning, not realising at first that I did not have to do the whole show in one take. Once I had figured this out, I did the different sections at my leisure and pieced them together at the end. Working in animations to the slideshow was quite laborious and took a lot of time and practice. I think perhaps using a different tool for a lecture like this next time would be more effective. Recording a TEAMS session would allow me to capture what it on my screen instead of trying to pre-prepare everything in powerpoint, I could work through some of the more complex calculations in Excel and capture this while I work

To what extent did you address different domains of learning?

As mentioned previously, the cognitive learning domain is the main focus of this lecture. In some of the theory sections, students are asked to describe, define, state, label, identify, create, draw, apply, illustrate and explain a variety of definitions, equations and systems. In the more problem based sections, they are asked to calculate, compare, contrast, draw and formulate. This is related back to examples (physical and theoretical) that were covered in class but this lesson is primarily a lecture where students listen, take notes, and practice in preparation for their end of year exam. We touch a little on the affective learning domain by using the discussion forum – here peer and student-teacher discussion is encouraged

What would I do differently next time?

While the powerpoint show is a good resource for the students to have to recap and prepare for exams, I feel that they missed out on the usual lecture-based lesson I give at the end of each year.

Next time I will probably use this resource again, but maybe upload it in advance and have students get questions prepared before providing an actual real lesson (online via TEAMS or in the classroom). The discussion forum is used sporadically and not every student gets involved.

Using some of the Student Based Learning Strategies such as **K_W_L** could be very useful for this lesson. Students could be split into groups (1 group for each learning outcome). 3 columns are drawn (what I **Know**, what I **Want** to know, what I have **Learned**). This is an excellent technique that could be incorporated throughout the module (or even this one lesson) to see how much we can move from column 2 into column 3 (Ogle, 1986). Unfortunately this year, there was no chance to implement such a strategy, but this is something I will definitely use in future years.