

Mapping Graduate Attributes in the Engineering Curriculum

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Background to the Project

During their most recent visit to the Engineering Faculty the Academic Board T&L found that students consider the communication between departments and between staff and students to be insufficient.

On the basis of these findings the Academic Board T&L recommended (amongst other things) that the Faculty:

“...should look at ways of improving communication between departments and between staff and students.”

The Faculty initiated a Curriculum Mapping Project in response to these recommendations, and as part of our ongoing processes of Quality Assurance for T&L in the Engineering Faculty.

The Curriculum Mapping Project aims to identify, characterize and map the teaching of key concepts, technical skills and graduate attributes in all four Engineering disciplines. In this poster, we describe the process and outcomes-to-date for mapping graduate attributes.

About Graduate Attributes

The Engineering Faculty has two formal sets of graduate attributes to incorporate in undergraduate curriculum:

- The Institution of Engineers, Australia (IEAust) specifies ten graduate attributes for courses it accredits. IEAust periodically reviews undergraduate T&L at each Australian Engineering school.
- The University of Sydney graduate attributes.

Figure 1 is an amalgamated list of graduate attributes based on those specified by IEAust and the University of Sydney.

Graduate Attributes

1. Problem Solving
2. Systems Thinking
3. Teamwork
4. Communication
5. Professionalism
6. Research & Inquiry Skills
7. Critical Thinking
8. Learning Skills
9. Sustainability

Fig 1: Synthesized from IEAust and University of Sydney Graduate Attributes

About Curriculum Mapping

Curriculum mapping is a process of identifying, characterizing and depicting the way that desired learning is incorporated into and developed over the course of a degree program.

A review of the published literature and internet searches suggest that only a few Engineering Schools have undertaken curriculum mapping. Fewer still make these maps available to their students.

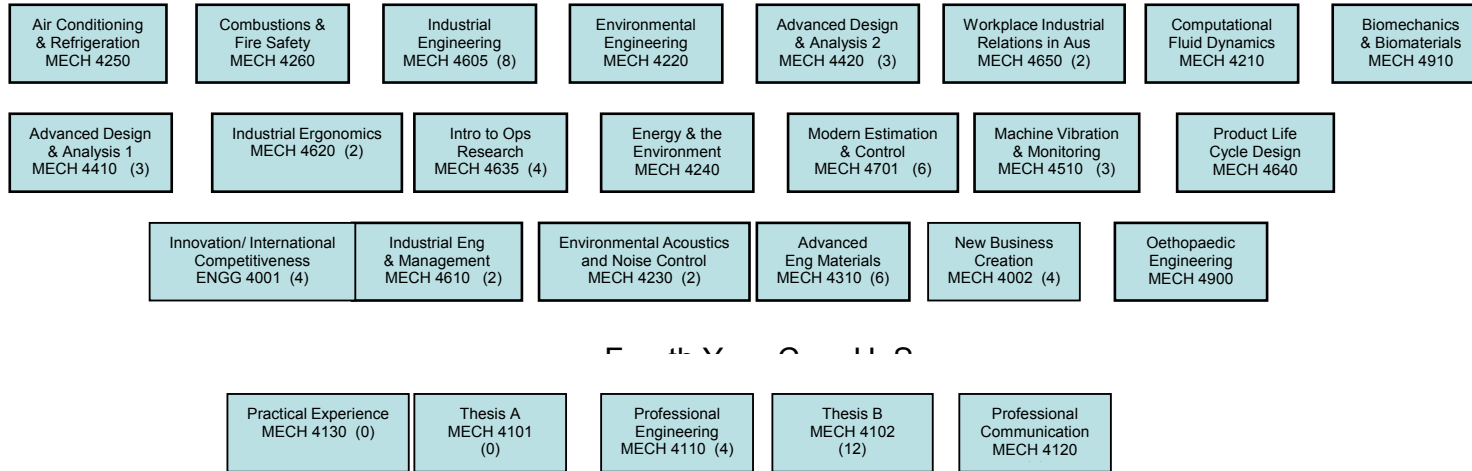
A good curriculum map should balance simplicity and detail, such that a novice learner could understand how and where they were expected to develop understanding of key concepts, skills or attributes.

Curriculum mapping is about making learning expectations and conceptual progression explicit.

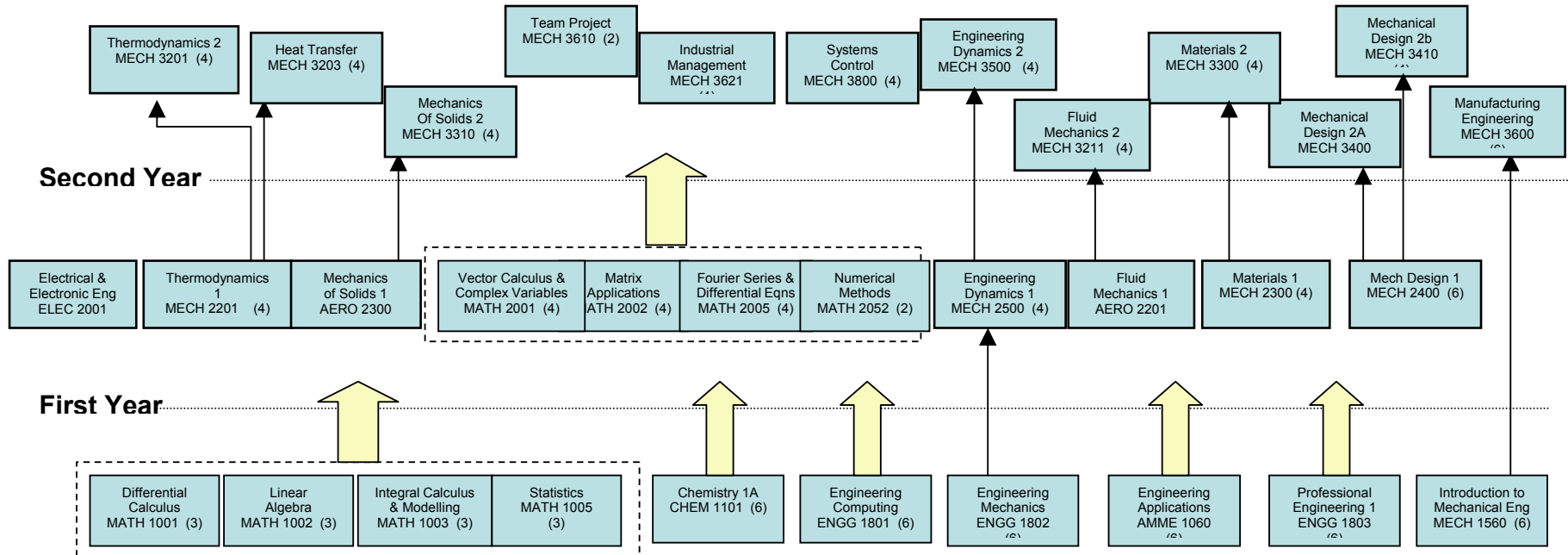
Figure 2 is a curriculum map of the Mechanical Engineering degree program. It shows all core units of study (UoS) and their prerequisite UoSs.

Mechanical Engineering Curriculum Map (Core UoS and Electives)

Fourth



Third Year



First Year

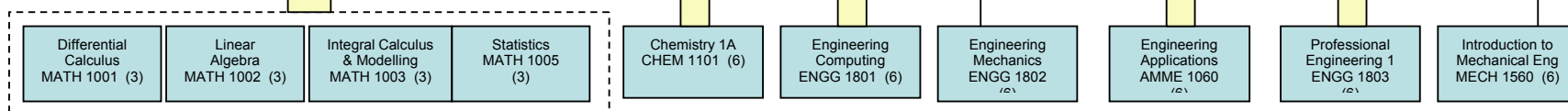
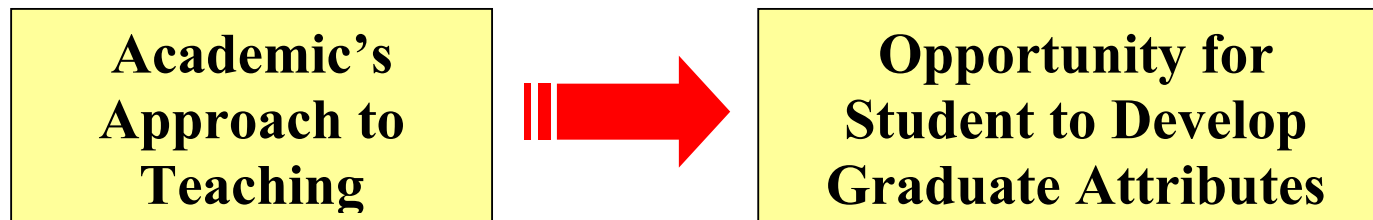


Fig 2: Mechanical Engineering Curriculum Map (2003 Curriculum)

Mapping Graduate Attributes

Early in the process of mapping graduate attribute development, it became apparent that students develop graduate attributes more as a function of what they are *doing* in class (teaching and learning activities), than what they are being *taught* in class (content).



Based on this, we have been asking academics how they structure the teaching, learning and assessment activities in the UoSs they teach.

What We Made

Building on the curriculum map in Figure 2, we were able to highlight those UoS which provided students with an opportunity to develop the graduate attributes we listed in Figure 1. The map below (Figure 3) is a draft map which shows those units of study in the Mechanical Engineering degree which incorporates teamwork.

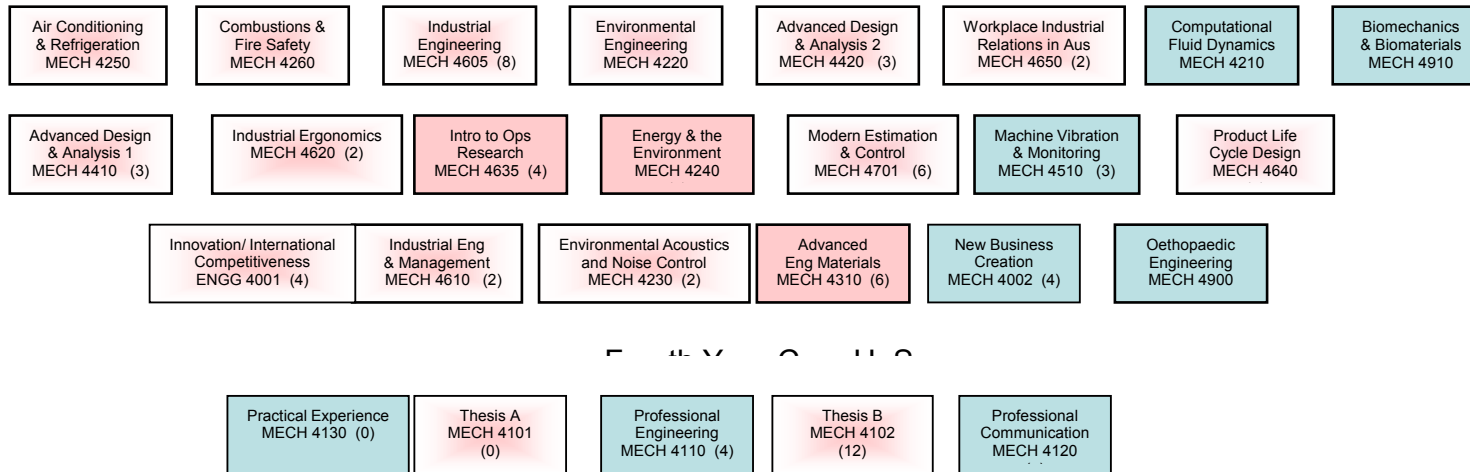
Maps like Figure 3 will be developed for all four disciplines of engineering and hosted on the Faculty website.

A potential further development would be for departments to specify 'performance criteria' for each attribute. Performance criteria clearly explain what students should be able to do to demonstrate they have attained the required proficiency in each graduate attribute.

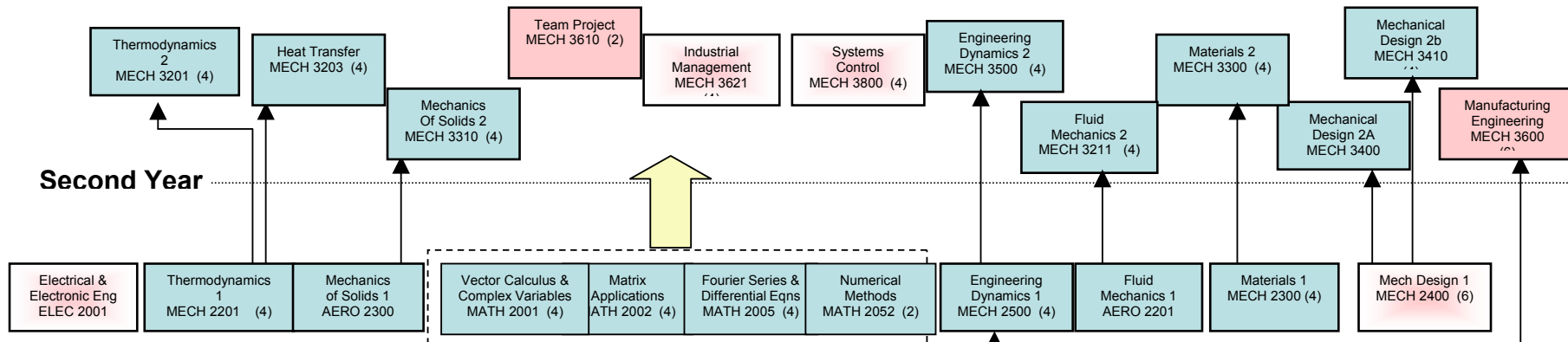
Graduate attribute maps with performance criteria would provide students and academics with an explicit and structured approach to teaching, learning and assessment for these most important of professional skills.

Graduate Attributes: **TEAMWORK** in Mechanical Engineering Curriculum

Fourth



Third Year



First Year

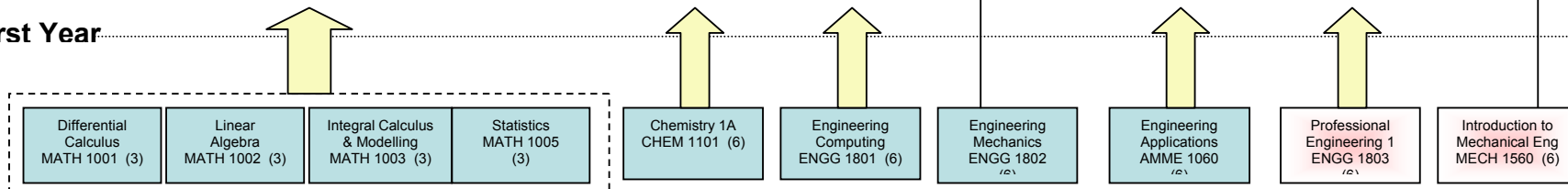
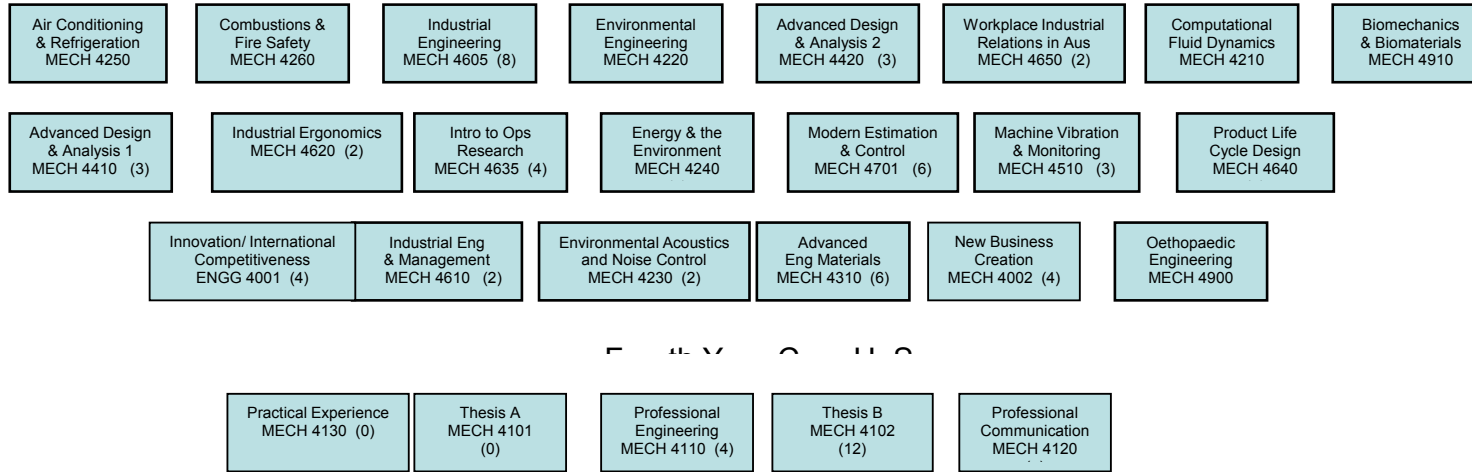


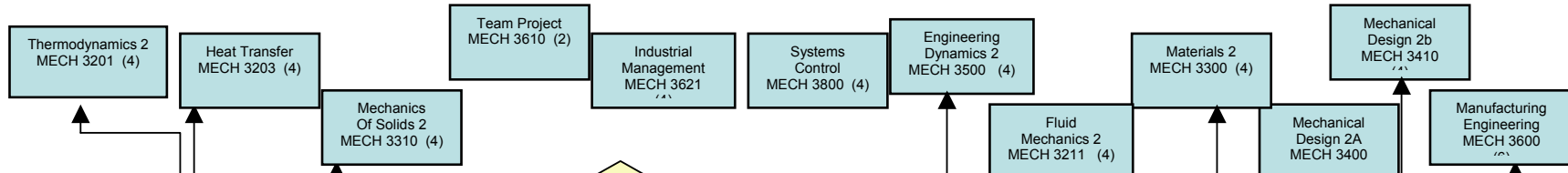
Fig 3: Mapping the Graduate Attributes within the Mechanical Engineering Curriculum

Mechanical Engineering Curriculum Map (Core UoS and Electives)

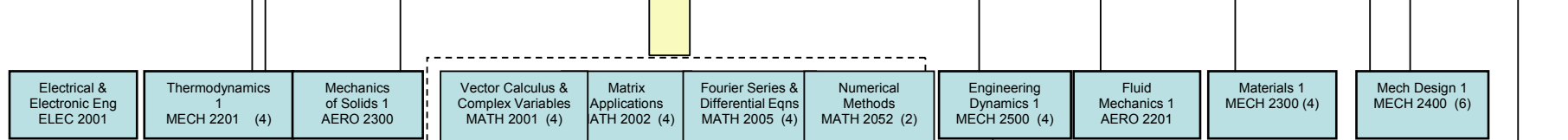
Fourth



Third Year



Second Year



First Year

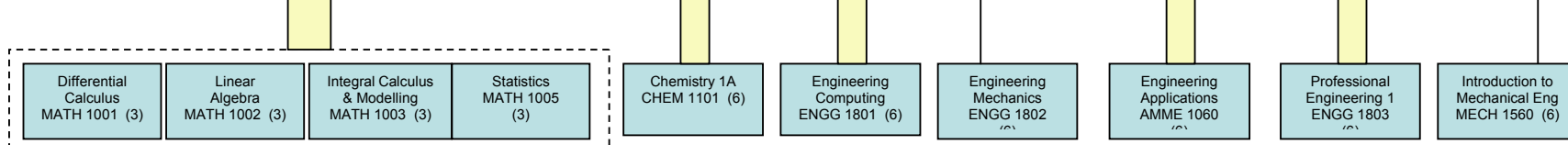
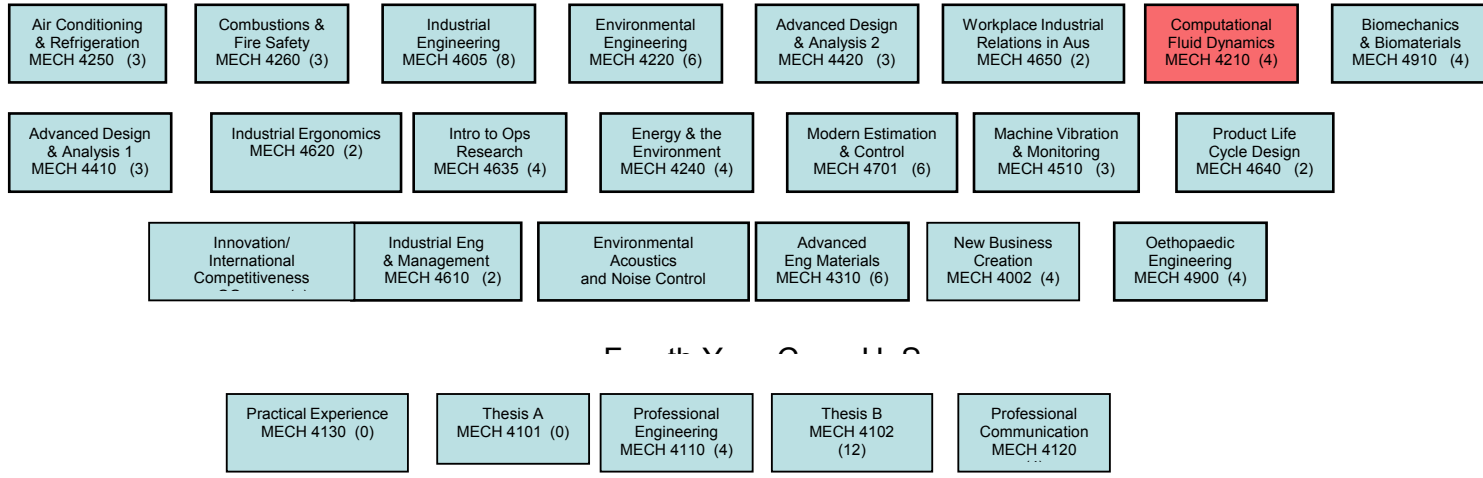


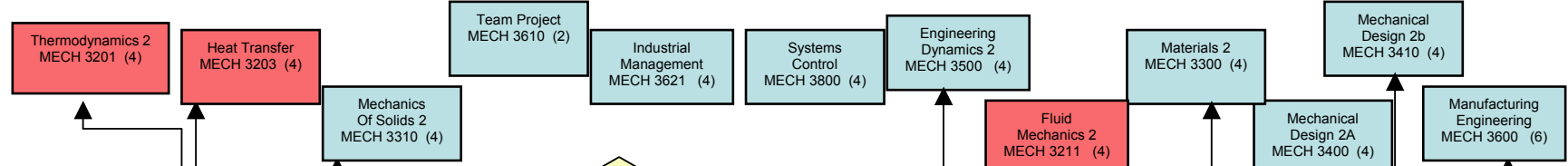
Fig 4: Dynamic Mapping – Mapping the knowledge progression within the Mechanical engineering Curriculum (continued in Fig 5)

4th Year Elective - Computational Fluid Dynamics

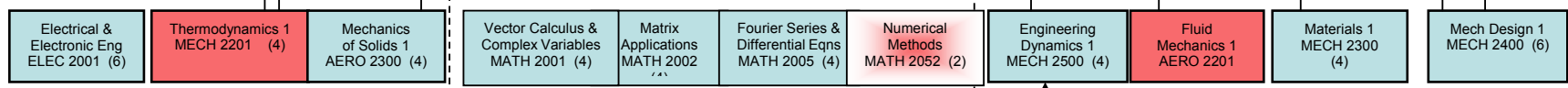
Fourth



Third Year



Second Year



First Year

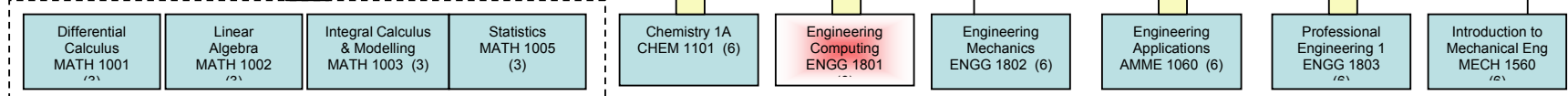


Fig 5: Dynamic Mapping – Illustrates the knowledge progression for Computational Fluid Dynamics