

Designing Evaluation Problems for Enhanced Learning of Engineering Materials

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Abstract

Introductory materials science is a key course in most undergraduate engineering programs. Students are introduced basic concepts about the structures and properties of materials used in modern engineering. Materials science differs from many other engineering courses in that the use of advanced mathematics, while important, is not as extensive. Rather, physical concepts describing and explaining the material behavior are emphasized. As a consequence, suitably crafted multiple choice problems are particularly helpful in testing student's understanding as well as for homework exercises. This presentation will focus on the design of such type of problems and how they can be best applied. For the purpose of illustrating the practice, an example topic is utilized: the tensile stress-strain response of metals, which is a central theme in both elementary and advanced materials courses. This approach allows a multi-faceted problem to be made into a very condensed form, which can aid the student to concentrate on the core issues. It can also alleviate the instructor's concern that there is often not enough space to cover a wide range of important topics. Most importantly, each student's true level of understanding can be evaluated and subsequently enhanced. The experience gained from the author's employment of this approach will be discussed.