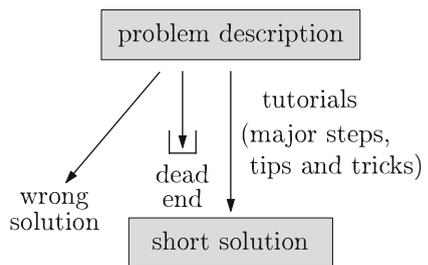


# Preface

This book results from the elective course ‘Continuum Damage and Fracture Mechanics’ (3510ENG) held at Griffith University, Australia, in the scope of the ‘Bachelor of Engineering with Honours in Mechanical Engineering’ degree program. This 13-week course comprises 2 hours of lectures and 2 hours of tutorials per week. Owing to the structure of the entire degree program, the course reviewed and extended in the first part, the classical theory of elastic and elasto-plastic material behavior. A thorough knowledge of these two topics is the essential prerequisite to cover the areas of damage and fracture mechanics. Thus, the second part of this course gives a first introduction to the treatment of damage and fracture in the scope of applied mechanics. Where possible, the one-dimensional case is first introduced and then in a following step generalized. This might be different to the more classical approach where first the most general case is derived and then simplified to special cases. In general, the requirements of mathematics are kept low and more challenging topics of damage and fracture mechanics are reserved for other courses, e.g., in the scope of a Master of Engineering program.

The supplementary problems within this book are taken from the tutorials offered to our students. A classical approach is here adopted (see Fig. 1) where a problem description is issued. The tutorial itself presents the major steps for the solution and gives tips and tricks. The final solution is as well available to the students. However, it is essential that students of engineering subjects try to find the way to the final solution on their own and not by simply looking at a full

**Fig. 1** Classical teaching and training approach in the scope of engineering education



step-by-step solution. Engineering skills and knowledge are acquired by actively getting trained to solve engineering problems. This is best achieved by taking an empty piece of paper to start the calculation and face the derivation difficulties from the very beginning.

While attempting to solve the problem, some students may reach a dead end, i.e., they do not have any further idea on how to proceed, or they may end up with a wrong solution. This is, from an educational point of view, not a major problem and should not be discouraging. Tutors and the lecturer will offer their help and provide guidance on how to overcome these when encountered.

This book should be understood as a first introduction to the topic and at least enable the reader to comprehend the basic ideas of the presented approaches of modeling in applied mechanics.

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