



# Real Life Examples in Thermodynamics

Lesson plans and solutions

Eann A Patterson, Editor

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## **INTRODUCTION**

These notes are designed to enhance the teaching of a sophomore level course in thermodynamics, increase the accessibility of the principles, and raise the appeal of the subject to students from diverse backgrounds. The notes have been prepared as skeletal lesson plans using the principle of the 5Es: Engage, Explore, Explain, Elaborate and Evaluate. The 5E outline is not original and was developed by the Biological Sciences Curriculum Study<sup>1</sup> in the 1980s from work by Atkin and Karplus<sup>2</sup> in 1962. Today this approach is considered to form part of the constructivist learning theory<sup>3</sup>, and a number of websites provide easy-to-follow explanations of them.

These notes are intended to be used by instructors and are written in a style that addresses the instructor; however this is not intended to exclude students who should find the notes and examples interesting, stimulating and hopefully illuminating, particularly when their instructor is not utilizing them. In the interest of brevity and clarity of presentation, standard derivations and definitions are not included since these are readily available in textbooks which these notes are not intended to replace but rather to supplement and enhance. Similarly, it is anticipated that these lessons plans can be used to generate lectures/lessons that supplement those covering the fundamentals of each topic.

This is the third in a series of such notes. The others in the series are entitled ‘Real Life Examples in Mechanics of Solids’ (ISBN: 978-0-615-20394-2) and Real Life Examples in Dynamics (ISBN: 978-0-9842142-0-4) are available on-line at [www.engineeringexamples.org](http://www.engineeringexamples.org).

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<sup>1</sup> Engleman, Laura (ed.), *The BSCS Story: A History of the Biological Sciences Curriculum Study*. Colorado Springs: BSCS, 2001.

<sup>2</sup> Atkin, J. M. and Karplus, R. (1962). Discovery or invention? *Science Teacher* 29(5): 45.

<sup>3</sup> e.g. Trowbridge, L.W., and Bybee, R.W., *Becoming a secondary school science teacher*. Merrill Pub. Co. Inc., 1990.

*Sophomore Thermo Course: Suggested exemplars within lesson plans*

## **NOTES FOR INSTRUCTORS ON EXAMPLE APPLICATIONS**

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