

Chemistry Chairperson releases first internationally-published book in the department's history

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Thermodynamics is like a frog; it never evolves, according to AUB's Chemistry Department chairperson.

But with his new book, "Chemical Thermodynamics: With Examples for Nonequilibrium Processes," Mazen Al-Ghoul is hoping that will change.

The world's view of thermodynamics – the study of energy conversion between heat and mechanical work – has not changed much in 200 years, according to Al-Ghoul.

"But this book has a new approach, a new philosophy," he told *AUB Bulletin*.

Whereas other publications have studied thermodynamics in ideal terms, Al-Ghoul's research aimed at tackling systems in nonequilibrium.

Everything on earth is in a state of nonequilibrium, Al-Ghoul explained, as everything is exposed to the sun and thus receives a constant input of energy.

"It's easy to tackle ideal systems at equilibrium, but when trying to make sense of irreversible, everyday phenomena at nonequilibrium, difficulties arise," he said. "This book attempts to bridge the gap between the ideal and the natural by approaching the problem in a different manner."

Al-Ghoul's book – the first ever to be published internationally from AUB's Chemistry Department – is based on a function called calortropy, or heat evolution, which forms a way to measure the entropy (or chaos) in nonequilibrium phenomena. In this way, thermodynamics becomes applicable to everyday situations.

Al-Ghoul has already begun teaching his students about calortropy in his chemistry classes and dedicated his book to future students of chemistry.

"We always had the students in mind when writing this book. It is a joy to be able to introduce new material that will later become applicable in the classroom," he said.

Al-Ghoul paid tribute to his wife, Rana, and co-author Byung Chan Eu, from McGill University, adding he was looking forward to the book's publication at the end of August.

"I'm extremely happy about this achievement, especially because it is the culmination of five years of hard work. The last year especially was tedious and stressful, but now that my book is being released, I can enjoy the fruits of my labor," he said.

