

Mathematics Courses Effect on Improving the Student's Learning Outcomes of Mechatronics Engineering at the University of Technology Bahrain

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Abstract

The effect of mathematics courses through the specialization courses on student outcomes in engineering programs is significant, and it is crucial for faculty to continually evaluate and improve the curriculum to ensure students are well-prepared for the challenges of the engineering field. Descriptive research design was used to determine the effect of mathematics courses on engineering specialization courses in improving the student outcomes of BS mechatronics engineering at University of Technology Bahrain. All assessments of 10 mathematics and 18 professional courses in SY2021-2022 were considered; the effectiveness of using mathematics courses in teaching the specialization courses are used in determining the achievements in each student's outcomes (SO1-SO7). Result shows, that through the mathematics courses: Probability and Statistics (57.14%), Calculus I&II (60.11%), numerical methods (64.32%), Advanced Math (67.19%) and Linear Algebra (71.42%) have dominant effects in the achievement of all SOs except SO4. While, Discrete Mathematics has 85.71% effect in the achievement of all SOs through the specialization courses. Moreover, College Algebra & Trigonometry (14.28%), Multivariate Calculus (19.25%), and Optimization (28.57%) have lower effects in improving SOs of mechatronics engineering. It is recommended that revisions of the mathematics syllabus to include topics on laws of logic, rules of inferences, quantifiers, proofs of theorems, set theory, trees and sorting, shortest path and minimal spanning trees algorithms, Monoids and Groups, Laplace and inverse Laplace transform, application of differentiation & integrations. Inclusion of these topics will enhance the teaching and learning of specialization courses, thereby, improving the achievement of engineering student outcomes.

Keywords: Students' Learning Outcomes, mathematics courses