

Evaluating Student Work in Engineering

The Grade of F

F-level work fails to display an understanding of the basic nature of engineering reasoning, and in any case does not display the engineering skills and abilities, which are at the heart of this course. The work at the end of the course is as vague, imprecise, and unreasoned as it was in the beginning. There is little evidence that the student is genuinely engaged in the task of taking charge of his or her engineering reasoning. Many assignments appear to have been done pro forma, the student simply going through the motions without really putting any significant effort into thinking his or her way through them. Consequently, the student is not analyzing engineering problems clearly, not formulating information accurately, not distinguishing relevant from irrelevant information, not identifying key questionable assumptions, not clarifying key concepts, not reasoning carefully from clearly stated premises, or tracing implications and consequences. The student's work does not display discernable engineering reasoning and problem-solving skills.

The Grade of D

D-level work shows only a minimal level understanding of what engineering is, along with the development of some, but very little, engineering skills or abilities. D-level work at the end of the course shows occasional engineering reasoning, but frequent uncritical thinking. Most assignments are poorly done. There is little evidence that the student is "reasoning" through the assignment. Often the student seems to be merely going through the motions of the assignment, carrying out the form without getting into the spirit of it. D-level work rarely shows any effort to take charge of ideas, assumptions, inferences, and intellectual processes. In general, D-level thinking lacks discipline and clarity. In D-level work, the student rarely analyzes engineering problems clearly and precisely, almost never formulates information accurately, rarely distinguishes the relevant from the irrelevant, rarely recognizes key assumptions, almost never describes key concepts effectively, frequently fails to use engineering vocabulary in keeping with established professional usage, and seldom reasons carefully from clearly stated premises, or recognizes important implications and consequences. D-level work frequently displays poor engineering reasoning and problem-solving skills.

The Grade of C

C-level work illustrates inconsistent achievement in grasping what engineering is, along with the development of modest engineering skills or abilities. C-level work at the end of the course shows some emerging engineering skills, but also pronounced weaknesses as well. Though some assignments are reasonably well done, others are poorly done; or at best are mediocre. There are more than occasional lapses in reasoning. Though engineering terms and distinctions are sometimes used effectively, sometimes they are used quite ineffectively. Only on occasion does C-level work display a mind taking charge of its own ideas,

assumptions, inferences, and intellectual processes. Only occasionally does C-level work display intellectual discipline and clarity. The C-level student only occasionally analyzes problems clearly and precisely, formulates information accurately, distinguishes the relevant from the irrelevant, recognizes key questionable assumptions, clarifies key concepts effectively, uses vocabulary in keeping with established professional usage, and reasons carefully from clearly stated premises, or recognizes important engineering implications and consequences. Sometimes the C-level student seems to be simply going through the motions of the assignment, carrying out the form without getting into the spirit of it. On the whole, C-level work shows only modest and inconsistent engineering reasoning and problem-solving skills.

The Grade of B

B-level work represents demonstrable achievement in grasping what engineering is, along with the clear demonstration of a range of specific engineering skills or abilities. B-level work at the end of the course is, on the whole, clear, precise, and well-reasoned, though with occasional lapses into weak reasoning. Overall, engineering terms and distinctions are used effectively. The work demonstrates a mind beginning to take charge of its own ideas, assumptions, inferences, and intellectual processes. The student often analyzes engineering problems clearly and precisely, often formulates information accurately, usually distinguishes the relevant from the irrelevant, and often recognizes key questionable assumptions, usually clarifies key concepts effectively. The student typically uses engineering language in keeping with established professional usage, and shows a general tendency to reason carefully from clearly stated premises, as well as noticeable sensitivity to important implications and consequences. B-level work displays good engineering reasoning and problem-solving skills.

The Grade of A

A-level work demonstrates advanced achievement in grasping what engineering is, along with the comprehensive development of a range of specific engineering skills or abilities. The work at the end of the course is, on the whole, clear, precise, and well-reasoned, though with occasional lapses into weak reasoning. In A-level work, engineering terms and distinctions are used effectively. The work demonstrates a mind beginning to take charge of its own ideas, assumptions, inferences, and intellectual processes. The A-level student often analyzes engineering problems clearly and precisely, often formulates information accurately, usually distinguishes the relevant from the irrelevant, often recognizes key questionable assumptions, and usually clarifies key concepts effectively. The student typically uses engineering language in keeping with established professional usage, frequently identifies relevant competing points of view, and shows a general tendency to reason carefully from clearly stated premises, as well as noticeable sensitivity to important implications and consequences. A-level work displays excellent engineering reasoning and problem-solving skills. The A student's work is consistently at a high level of intellectual excellence.