Assignment ID: _____ Reviewer Name: _____

Assessment Rubric: Conductive Heat Transfer Project

The conductive heat transfer project is a required component of CHBE 322, a course taken by all CHBE majors. I am including the project in the student portfolio as an example of a computer-based project. It is intended to provide assessment data relevant to program outcome **k**.

> k. …ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

The project is intended to accomplish a number of things:

- The students are to learn to solve differential equations numerically.
- The students are to learn about conduction heat transfer.
- The students are to learn that multiple software platforms can be used to solve these problems.

In the context of outcome k, this assignment allows the students to demonstrate the following:

- Techniques: matrix math, 2d steady conduction problem formulation
- Tools: Excel, Mathcad, Comsol Multiphysics
- Skills: computer software proficiency, numerical integration of differential equations

This assessment rubric (other side of page) is designed to help evaluate student performance in outcome k.

Outcome k. … ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Outcome element	Unacceptable (0)	Marginal (1)	Acceptable (2)	Exceptional (3)	Points
Ability to use the techniques necessary for engineering practice – matrix math	Nearly all matrix math techniques applied incorrectly in nearly all cases.	One matrix math technique consistently applied incorrectly. Multiple matrix math techniques occasionally applied incorrectly.	Matrix math techniques generally applied correctly with infrequent errors.	Matrix math techniques applied with verification techniques to ensure that errors are avoided.	
Ability to use the techniques necessary for engineering practice – 2d steady conduction problem formulation	Student was unable to create the required matrices to solve a steady 2d conduction problem.	Able to apply the technique to create the required matrices and obtained a solution, but had obvious errors that went unaddressed.	Able to apply the technique to create the required matrices and obtain a correct solution.	Able to develop extensions to the technique to handle situations not covered in class.	
Ability to use the modern engineering tools necessary for engineering practice – multiple software products	Student was unable to use any software product to obtain a solution.	Able to obtain a solution using one product, but unable to use multiple products to obtain the same solution.	Able to obtain the solution using all software products.	Able to use what they learned in solving the assigned problem to obtain a solution to a different problem.	
Ability to use the skills necessary for engineering practice – computer software proficiency (SAME AS ABOVE)	Student was unable to use any software product to obtain a solution.	Able to obtain a solution using one product, but unable to use multiple products to obtain the same solution.	Able to obtain the solution using all software products.	Able to use what they learned in solving the assigned problem to obtain a solution to a different problem.	
Ability to use the skills necessary for engineering practice – numerical integration of differential equations	Student was unable to obtain a solution to the 2d conduction problem.	Able to apply the technique to obtain a numerical solution, but unable to discern obvious errors in the solution.	Able to apply the technique to obtain a correct solution.	Able to apply the technique in novel situations to obtain correct solutions.	

Assessing the assessment tool…

After completing the assessment of the transport projects, please complete the following items on a fresh assessment form.

This assessment rubric was: [useless] -- | -- [marginal] -- | -- [helpful] -- | -- [awesome]

Suggestions for improving this tool…