CH402 Chemical Engineering Process Design – Assessment Rubric for IPR2 [See Note 1 below]

Level	Reaction Process Design	Distillation Process Design	Pump and Exchanger Design	Safety and Environmental	Simulation
1	Cadets have defined target conversion (constraint).	Cadets have defined target separations (constraints).	Cadets have identified each pump in the process and defined operating conditions for each pump.	Cadets have identified all potentially hazardous components in the process.	All cadets have installed the simulator on PCs, begun tests, identified operational issues, and made corrections to the P&ID.
2	Cadets have calculated the mass of catalyst required to obtain target conversion constraint.	Cadets have established shortcut columns (or McCabe – Thiele calculations) for each column, and can produce estimates of heating and cooling duties.	Pump design is complete and cadets have determined the cost of each pump in the process.	Cadets have MSDS datasheets for each chemical component in the process (utilities not required).	Cadets have attempted the cold startup and have identified program errors or operational problems that require program changes.
3	Cadets have identified physical constraints on catalyst and used constraints to calculate pressure drop in the reactor [2].	Cadets have full rigorous columns working at process conditions in ChemCAD.	Cadets have identified each heat exchanger in the process and defined operating conditions for each pump.	Cadets have an organized table that lists all exposure risks.	Cadets have completed routing and inspection checklists for the steady-state operation of the plant.
4	Cadets have configured catalyst into a practical reactor design. They have specified number of reactors, number and length of tubes.	Cadets have full working rigorous column working at process conditions in ChemCAD and designs have been optimized with respect to target separations.	Pump and heat exchanger design is complete. Mechanical design of pumps and heat exchangers is complete. Pumps and heat exchangers are working in ChemCAD.	Cadets have an organized table that lists all fire and explosion risks.	By experimentation, cadets have identified the key control points in the FBR plant.
5	Cadets have calculated heat duties and heat transfer coefficients for each reactor, and have decided on safety devices that may be required for the reactor.	Cadets have full working rigorous calculations with mechanical design complete, for each column in the process.	Pump and heat exchanger design is complete and costs of equipment have been determined.	Cadets have an organized table that lists all environmental risks.	Cadets have calculated control valve size for control valves at key locations.

Cadets: Score: Date:

Comments:

Notes: [1] IPR1 rubric must be complete to move to level 1. [2] Pressure drop is determined using the Ergun equation.