**NE 795-014 Advanced Reactor Materials and Materials Performance**

**Exam 1**

Please provide your responses to the following questions. Point values indicated expected depth of response.

1. What are some key differences between high-temperature gas reactors and light water reactors? (8 pts)
2. What are the individual layers in a TRISO particle? What purpose does each layer have? (14 pts)
3. What are the trade-offs between carbide and oxide fuel kernels? (10 pts)
4. How does the nature of irradiation damage accumulation change with irradiation temperature in SiC? (12 pts)
5. How does thermal conductivity change in SiC with irradiation? What are the primary phonon scatterers, and why can someone determine the thermal conductivity from the swelling in SiC? (10 pts)
6. Discuss the role of fission products on the failure of TRISO particles? (10 pts)
7. How does graphite dimensionally change under irradiation? Why does this behavior happen? (14 pts)
8. List at three types of failure mechanisms for TRISO particles. (8 pts)
9. Provide one example of an advanced TRISO concept and explain why it is of interest. (8 pts)
10. What are three phenomena/behaviors that need to be accounted for in fuel performance modeling of TRISO fuels? What is one data need for fuel performance modeling? (6 pts)