# Enhanced Heat Transfer (ME 763)

Fall 2009

**Class Time: Monday & Wednesday 3:30~5:00PM, SEM 231C**

**Objective:** Introduce methods of enhanced heat transfer to graduate level students pursuing Heat Transfer at a more advanced level.

**Instructor:** Chanwoo Park, Room: PE 209, Tel.: 682-6301 (office), email: chanwoo@unr.edu

**Office Hours:** Tuesday & Thursday, 11AM~12PM & 1PM~3PM, or by appointment

**Textbook:** *Principles of Enhanced Heat Transfer*, R. L. Webb and N.-H. Kim, 2nd ed., Taylor & Francis, 2005

**Grading Policy:** The grade is based on exam, homework/article presentation and a project.

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|---|---|---|
| Final Exam | 25% | Wednesday, December 16 (tentative) |
| Homework | 15% | |
| Article Presentation | 20% | |
| Project | 40% | |

The exam is open book. Make-up exam is not given. Homework is not accepted late. Article presentation will be assigned during the semester.

**Course Coverage**

| Topic | Textbook | References |
|---|---|---|
| 1. Introduction to Enhanced Heat Transfer | 1,2 | |
| 2. Heat Transfer Fundamentals | | Heat Transfer Handbook, ch. 14<br>Heat Transfer, 2nd ed. (A.F. Mills) |
| 3. Performance Evaluation Criteria for Single Phase Flow | 3 | HB of Thermal Engineering, ch. 4.15<br>Heat Transfer HB, ch. 14 |
| 4. Performance Evaluation Criteria for Two-Phase Heat Exchangers | 4 | |
| 5. Plate-and-Fin Extended Surfaces | 5 | |
| 6. Pool Boiling | 11.1~11.9 | |
| 7. Thin Film Evaporation | 11.10~11.13 | |
| 8. Convective Vaporization | 13 | |
| 9. Vapor Space Condensation | 12 | |
| 10. Convective Condensation | 14 | |
| 11. Simultaneous Heat and Mass Transfer | 16 | |
| 12. Additives for Gases and Liquids | 17 | |
| 13. Direct Contact Heat Transfer | | HB of Thermal Engineering, ch. 4.21 |
| 14. Electronic Cooling Heat Transfer | 19 | Heat Transfer HB, ch. 13 |
| 15. Microchannels | 18 | |
| 16. Heat Pipes | | HB of Thermal Engineering, ch. 4.16 |
| 17. Spray and Jet Impingement | | HB of Thermal Engineering, ch. 4.17<br>Heat Transfer HB, ch. 13.5 |
| 18. Immersion Cooling | | Heat Transfer HB, ch. 13.7.2 |
| 19. Thermoelectric Coolers | | Heat Transfer HB, ch. 13.8 |
| 20. Heat Transfer in Porous Media | | Principles of Heat Transfer in PM |

**References:**

1. F. Kreith, *CRC Handbook of Thermal Engineering*, CRC Press, 1999.
2. A. Bejan and A. Kraus, *Heat Transfer Handbook*, John Wiley & Sons, 2003.
3. A.F. Mills, *Heat Transfer*, 2nd ed., Prentice Hall, 1999.
4. A. Bejan, *Convection Heat Transfer*, 3rd ed., Wiley, 2004.
5. A. Faghri, *Heat Pipe Science and Technology*, 4th ed., Taylor & Francis, 2005.
6. J.G. Collier and J.R. Thome, *Convective Boiling and Condensation*, 3rd ed., Oxford University Press, 1996.
7. M. Kaviany, *Principles of Heat Transfer in Porous Media*, 2nd ed., 1995, 2nd corr. 2nd printing, 1999, Springer-Verlag.