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| Course Name | FLUID AND THERMAL ENGINEERING |
| Instructor Name | M. Kameda, K. Iwamoto, Y. Ueda, and Y. Tagawa |
| Course Structure | Lecture and Exercise |
| Course Credits | 3 |
| Course Overview | The course combines the basic principles in Thermodynamics, Heat Transfer and Fluid Mechanics into one integrated subject. The course will cover: introductory concepts and definitions of thermodynamics, first law of thermodynamics, evaluating properties, control volume analysis for mass and energy, Carnot cycle, fluid statics and buoyancy, control volume analysis for momentum conservation, Bernoulli equations, and heat transfer modes including conduction, convection and radiation. Case studies based on real-world thermal systems will be used throughout the class to illustrate the connection between these interdisciplinary subjects.  |
| Course Key Words | Thermodynamics, fluid mechanics, heat transfer |
| Academic Goal | Course Outcome 1: You are able to use scientific notation and engineering units for the description of fluid flow and energy transfer.Course Outcome 2: You are able to interpret measurements of thermodynamic quantities for description of fluid flow and energy transfer.Course Outcome 3: You are able to use concepts of continuum fluid dynamics to interpret physical situations.Course Outcome 4: You are able to apply thermodynamics to the analysis of energy conversion and cooling/heating situations. |
| Course Schedule | Week 1. Introductory concepts and definitions of thermodynamics. 2. First law of thermodynamics 3. P-V-T relation 4.Conservatin of mass for a control volume 5. Conservation of energy for a control volume 6. Evaluating properties using the ideal gas model 7.Carnot cycle 8. Fluid statics 9. Conservation of momentum for a control volume 10. The Bernoulli equation 11. Heat transfer modes: conduction, convection, and radiation |
| Textbooks, References, and Supplementary Materials | M. J. Moran, H. N. Shapiro, B. R. Munson, and D. P. DeWitt, Introduction to Thermal Systems Engineering – Thermodynamics, Fluid Mechanics, and Heat Transfer, (ISBN 0-471-20490-0), John Wiley & Sons, 2003. |
| Grading Philosophy(Percentage / Criteria / Methodology) | Classwork exercises 25%, Examinations 75% |