



Course Title: Heat Exchanger Design and Operation

Course ID:	Course Type:
CH294	Instructor-led (classroom) Course
http://www.aiche.org/ch294	

Course Schedule

Day One

8:00 – 8:30	Registration
8:30 – 10:00	Types and applications of heat exchangers Types <ul style="list-style-type: none"> • Shell-and-tube heat exchangers • Air coolers • Plate-frame exchangers • Compact plate-fin exchangers Applications <ul style="list-style-type: none"> • Single-phase • Boiling/evaporating • Condensation
10:00 – 10:15	Morning Break
10:15 – Noon	Fundamentals of heat exchanger performance <ul style="list-style-type: none"> • Energy balance • Rating methods <ul style="list-style-type: none"> – F-LMTD – e-NTU – Incremental computer-based • Pressure drop • Performance margins <ul style="list-style-type: none"> – Fouling factors – Cleanliness factors
Noon – 1:00	Lunch Break

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| 1:00 – 3:00 | Heat exchanger selection criteria <ul style="list-style-type: none"> • Cost • Operating Conditions <ul style="list-style-type: none"> – Transient • Maintenance needs <ul style="list-style-type: none"> – Cleaning schedule • Material selection <ul style="list-style-type: none"> – Fluid compatibility • Mechanical considerations <ul style="list-style-type: none"> – Temperature and pressure |
| 3:00 – 3:15 | Afternoon Break |
| 3:15 – 5:00 | Single-phase applications <ul style="list-style-type: none"> • Heat transfer coefficients • Pressure drop • Extended surfaces • Enhancements <ul style="list-style-type: none"> – Tube inserts |

Day Two

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| 8:30 – 10:00 | Boiling applications <ul style="list-style-type: none"> • Boiling fundamentals <ul style="list-style-type: none"> – Pool boiling – Flow boiling • Two-phase pressure drop • Typical services <ul style="list-style-type: none"> – Refrigerant evaporators – Reboilers |
| 10:00 – 10:15
10:15 - Noon | Morning Break
Condensing applications <ul style="list-style-type: none"> • Condensing fundamentals <ul style="list-style-type: none"> – Film condensation – Condensing regimes • Pressure drop considerations • Condenser geometries |
| Noon – 1:00
1:00 – 3:00 | Lunch Break
Operational problems <ul style="list-style-type: none"> • Fouling • Vibration • Venting and draining |

- Reboiler problems
 - Instability
 - Film boiling
- Temperature pinch

3:00 – 3:15

3:15 – 5:00

Afternoon Break

Troubleshooting

- Use of field data
 - Accuracy of measurements
 - Accuracy of performance models
- Inspections
 - Typical mechanical defects/degradation