

## INDUSTRIAL ENERGY PROCESSES

### 1.1. Identification

|             |  |   |                |   |                |                              |                |  |             |  |              |  |
|-------------|--|---|----------------|---|----------------|------------------------------|----------------|--|-------------|--|--------------|--|
| University: | Kungliga Tekniska Högskolan (Stockholm)    |   |                |   |                |                              |                |  |             |  |              |  |
| School:     | School of Chemical, Science and Technology |   |                |   |                |                              |                |  |             |  |              |  |
| Course:     | Industrial Energy Processes                |   |                |   |                |                              |                |  |             |  |              |  |
| ECTS:       | 7.5  |   |                |   |                |                              |                |  |             |  |              |  |
| Semester:   | <i>Winter</i>                              |   |                | X | <i>Summer</i>  |                              |                |  |             |  |              |  |
| Category    | <i>Fundamental course</i>                  |   |                |   | X              | <i>Specialisation course</i> |                |  |             |  |              |  |
| Module      | <i>MFI</i>                                 | X | <i>MFII</i>    |   | <i>MFIII</i>   |                              | <i>MSI</i>     |  | <i>MSII</i> |  | <i>MSIII</i> |  |
| Teachers:   | Mats Westermark                            |   |                |   |                |                              |                |  |             |  |              |  |
| Language:   | <i>English</i>                             |   | <i>Italian</i> |   | <i>Swedish</i> | X                            | <i>Spanish</i> |  |             |  |              |  |

### 1.2. Learning-outcomes

-knowledge about production processes and products in the chemical industry, related to environmental and safety issues in connection to heat and power production

### 1.3. Competencies

#### ▪ General

- to analyse and solve complex problems on environmental issues of industrial processes
- to have critical understanding of technical and scientific tools
- to work and manage teams
- communication skills (both written and oral)
- to work in an international context

#### ▪ Specific

- to look for and determine thermodynamic properties of pure substances
- to use advanced thermodynamics concepts for the understanding of industrial chemical processes
- to apply environmental and safety issues for the management of heat and power production processes
- to use modern methods for the economic evaluation of the energy requirements in industrial energy processes

### 1.4. Contents

Energy conversion for the different technical thermodynamic processes. Theoretical and real thermodynamic cycles. New energy technology of importance to process industry. The exergy concept is introduced and applied. Economic aspects and consequences of heat and power production. Measures to improve the efficiency in

energy use. Analyses of industrial energy systems. Environmental and safety matters in connection with energy conversion processes.

### **1.5. Teaching Methodology**

- Lecture sessions
- Practical sessions: “cooperative work” for solving problems

### **1.6. Evaluation**

- written exams
- oral evaluation of the homework assignments

### **1.7. Bibliography**

- M.J. Moran, H.N. Shapiro. “Fundamentals of Engineering Thermodynamics”.  
John Wiley & Sons