# Course Syllabus of Modelling Methods for Applied Physics

**Accad. year 2016/17**

## 2. Professor
Andrea Gasparella

## 3. ECTS Credits

<table>
<thead>
<tr>
<th>Office</th>
<th>K0.08</th>
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<tbody>
<tr>
<td>Scientific Field</td>
<td>ING-IND/11</td>
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## 4. Course Hours

| Lectures | 30 |
| EXERCISES AND LABS | // |
| Others | |

## 5. Study Programme
PhD Program Sustainable Energy and Technology

## 6. Major in

//

## 7. Year
1st SEMESTER

## 8. Programme Status
Optional

## 9. Course Language
English

## 10. Description
The dynamic behaviour of thermotechnical systems is strongly dependent on the thermal heat transfer and in particular on thermal heat conduction in solids in non steady state conditions.
The course gives to the student the fundamentals for Heat Transfer in unsteady state and deals with the numerical tools.
It proposes the analysis of the numerical techniques for solution of unsteady state of thermal conduction problems with application in the field of engineering and in particular of building physics.
The course proposes an insight to the methods of calculation of the heat transfer and heat and mass balance within buildings.
Specific examples and lab practice will enable the students to practically apply and evaluate the topics of the class lessons.

## 11. Teaching Format and Organization
Front lesson with slides and blackboard.
Practical examples at the blackboard and on the pc
| 12. LEARNING OUTCOMES | • Knowledge and understanding of the dynamic building simulation methods.  
• Knowledge of the main differences between numerical tools.  
• Operative skills in solving by numerical methods the heat transfer problem. |
| --- | --- |
| 13. TOPICS | Part 1) Unsteady state heat transfer  
Numerical methods for non steady state thermal heat conduction.  
Finite difference methods for 2 and 3D problems in steady and unsteady state.  
Use of the electronic sheet for finite difference schemes solution. Applications example and practice to building components.  
Part 2) Simulation methods for complex systems: building and plant system  
Part 3) Application of building simulation methods.  
| 14. BASIC BIBLIOGRAPHY | Suggested Books  
| 15. ELIGIBILITY |  |
| 16. RECOMMENDATIONS |  |
| 17. STUDENT ASSESSMENT | Written numerical project  
Evaluation based on a 30 points scale |