

PHYS-E0562 Nuclear Engineering, advanced course

Course staff:

Lecturer: **Jaakko Leppänen**, Research Professor (VTT) / Adjunct Professor (Aalto)¹

Assistant: **Ville Valtavirta**, Research Scientist (VTT)²

Lecturer (special topic): **Joona Kurki**, Research Team Leader (VTT)

Lecturer (special topic): **Elina Syrjälähti**, Senior Scientist (VTT)

Lecturer (special topic): **Ville Tulkki**, Senior Scientist (VTT)

Lecturer (special topic): **Jaakko Kuopanportti**, Design Engineer (Fortum)

Schedule:

Lectures: Thursday 14:15 – 17:00 at K201

Exercises: Tuesday 8:15 – 10:00 at K150

1st Mid-term exam: TBD (covers lectures 1 - 6)

2nd Mid-term exam: TBD (covers lectures 7 - 11)

Exam: TBD

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Lecture topics: (preliminary order)

- Lecture 1** – Introduction to course topics
- Lecture 2** – Deterministic transport theory
- Lecture 3** – Monte Carlo simulation
- Lecture 4** – Diffusion theory
- Lecture 5** – Burnup calculation
- Lecture 6** – Basics of heat transfer and coolant flow
- Lecture 7** – Spatial homogenization
- Lecture 8** – Nodal diffusion methods
- Lecture 9** – System-scale thermal hydraulics
- Lecture 10** – Nuclear fuel behavior
- Lecture 11** – Reactor dynamics
- Lecture 12** – Design and simulation of reactor operating cycle

Lecture slides form sufficient course material, but text book:

W. M. Stacey, “Nuclear Reactor Physics”, Wiley, 2001

can be used as support.