



# A.N.T. International Academy

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## ONLINE EDUCATION

## PWR Chemistry Advanced

### COURSE DESCRIPTION

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The course comprises four technical areas: Structural material degradation, fuel materials, fuel thermal-hydraulic and coolant chemistry. The principal focus of this course, coolant chemistry, covers both primary and secondary side.

Background information is provided on fuel and degradation of plant materials because the primary coolant chemistry affects fuel performance, but is generally targeted towards minimising corrosion of structural materials and minimising the buildup of plant activity.

Information is provided on the nuclear and thermal-hydraulic behaviour of fuel assemblies because irradiation and temperature are primary factors in the behaviour of fuel materials.

The content is described more in the [Appendix](#).



### AUTHORS/LECTURERS

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The lecturers, World Class Experts in their fields, are as follows:

*Structural Material Degradation:*

**Peter Ford, Peter Scott and Pierre Combrade.**

*Coolant Chemistry and Corrosion:*

**Francis Nordmann, Suat Odar and Dewey Rochester.**

*Fuel Material:*

**Alfred Strasser, Richard Collingham, Charles Patterson, Friedrich Garzarolli, Ron Adamson and Peter Rudling.**

[Read more about the Experts](#)

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## COURSE MATERIAL

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The course material was developed by A.N.T. International and consists of earlier recorded A.N.T. International Seminars and associated Reports published by A.N.T. International.

Parts of the following Reports are being used in this course:

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|--|------------------------|
| • Environmentally-Assisted Degradation of Structural Materials in Water Cooled Nuclear Reactors — An Introduction (SMDR) | <a href="#">Sample</a> |
| • Fuel Material Technology Report (FMTR) — Volume I  | <a href="#">Sample</a> |
| • PWR/VVER Primary Side Coolant Chemistry, Volume I — Technical Basis and Recent Discussion (LCC7 STR)                   | <a href="#">Sample</a> |
| • PWR/VVER Primary Side Coolant Chemistry, Volume II — Water Chemistry Tool to Mitigate the Concerns (LCC8 STR)          | <a href="#">Sample</a> |
| • PWR and VVER Secondary System Water Chemistry  | <a href="#">Sample</a> |

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## COURSE DURATION

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- Total time: around 6 weeks of full-time studies
- Literature: 125 h
- Lectures: 85 h
- 4 Exams: 4 h

More time may be needed to digest the information provided in this course.

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## CERTIFICATE

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You will automatically receive an email with your certificate that you can print or share on social media. If you need a printed certificate, please don't hesitate to contact us and we can send it to you via regular mail. You reach us at [support@antinternational.com](mailto:support@antinternational.com).

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Please also visit our website for the latest updated information, [www.antinternational.com](http://www.antinternational.com)



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# Appendix: Course outline and topics covered

## 1) STRUCTURAL MATERIAL DEGRADATION

- 1.1 Introduction and background to material degradation
- 1.2 Physical metallurgy of structural alloys
- 1.3 Corrosion basics
- 1.4 Water chemistry in nuclear plants
- 1.5 Uniform, accelerated and localised corrosion
- 1.6 Environmentally-assisted cracking of carbon/low alloy steels, austenitic and Ni-base alloys

## 2) PWR FUEL PERFORMANCE

- 2.1 Fuel design, materials
- 2.2 In-reactor performance of fuel
- 2.3 Effects of coolant chemistry on fuel performance

## 3) PWR CHEMISTRY AND CORROSION

- 3.1 Radiochemistry
- 3.2 Primary coolant system
- 3.3 Auxiliary system
- 3.4 Secondary system
- 3.5 Chemical control



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