



Shelf Life 2.0

The three clocks: texture, microbiology & chemistry

Dates	15–18 February 2027 (week 7) · optional 5th day 19 February
Times	Monday–Thursday, 08.30–17.00/17.30 CET · optional 5th day (Friday) until 16.00
Location	Bakery Academy Application Centre, Het Aanleg 18D, 9951 NN Winsum, the Netherlands
Level	Intermediate to advanced
For	R&D, NPD, application, QA/QC and production professionals
Group size	Maximum 8 participants
Included	Course, practice materials, lunch on all course days, booklet with presentations, formulations and theory, and a Bakery Academy certificate.
Before the course	Optional: bring one or two of your own products with recipe and specification for the shelf-life clinic.

Course programme

Shaded rows are breaks. Practical sessions are shown in medium weight.

Monday 15 February

Day 1 · Product classification & the three clocks

08.30	Welcome and introductions · your products and shelf-life questions	
09.00	Product classification: bread, cake, biscuits and crackers, laminated and filled products · moisture, aw, pH and fat as product-matrix limiters	Theory
10.00	Coffee break	
10.15	The concept of shelf life: the three clocks — texture (staling, loss of crispness), microbiology (mould, yeast, rope) and chemistry (oxidation, moisture migration) · sensory versus microbiological end of shelf life	Theory
11.30	Measuring each clock: firmness and sensory evaluation, aw, pH and moisture, indicators of oxidation	Theory
12.30	Lunch	
13.30	Practice: classifying the course products by their first-failing clock · baseline measurements (aw, pH, moisture, firmness) · baking the reference bread and cake	Practice
17.00	Result discussion	Discussion

Tuesday 16 February

Day 2 · Internal factors I — ingredients & formulation

08.30	Water, sugars and humectants: water activity and its effect on all three clocks	Theory
09.30	Salt, acids and preservatives · clean-label alternatives (fermentates, vinegar)	Theory
10.15	Coffee break	
10.30	Enzymes, emulsifiers and hydrocolloids: anti-staling and moisture retention (amylases incl. maltogenic amylase, lipases, xylanases)	Theory
11.30	Fats, oils and antioxidants: oxidative stability	Theory
12.30	Lunch	
13.30	Practice: formulation series on bread and cake, one lever per clock (humectant/ <i>aw</i> , acid or preservative, enzyme, fat/antioxidant) · compensating for baking quality	Practice
17.00	Result discussion	Discussion

Wednesday 17 February

Day 3 · Internal factors II — process, hygiene & prediction

08.30	Process and shelf life: mixing, fermentation, baking (core temperature, bake loss), cooling and slicing	Theory
09.30	Hygiene and sanitation after the oven: recontamination and condensation	Theory
10.15	Coffee break	
10.30	Formulation and prediction: <i>aw</i> calculation and shelf-life models · building a model for your own product	Theory
12.30	Lunch	
13.30	Practice: process variations (bake profile, cooling) · model prediction versus measured values · evaluation of the pre-aged samples on all three clocks	Practice
17.00	Result discussion	Discussion

Thursday 18 February

Day 4 · External factors — packaging, storage & distribution

08.30	Packaging: barrier properties, MAP and active packaging (oxygen absorbers, ethanol emitters)	Theory
09.30	Storage and distribution: temperature, humidity, chilling and freezing — the effect on each clock	Theory
10.15	Coffee break	
10.30	Shelf-life testing: real-time versus accelerated tests, challenge tests and acceptance criteria	Theory
11.30	Practice: measuring the stored course samples (<i>aw</i> , pH, moisture, firmness, sensory)	Practice
12.30	Lunch	
13.30	Workshop: shelf-life test plan for your own product — which clock, which internal and external levers	Discussion
15.30	Review: the three clocks × internal and external factors	Discussion
16.30	Evaluation and certificates	
17.00	End of course	

Friday 19 February (optional — bookable separately)**Optional day 5 · Shelf-life clinic**

08.30	Clinic: diagnosis of participants' own products along the three clocks	Discussion
10.00	Coffee break	
10.15	Practice: test set-up with your own products	Practice
12.30	Lunch	
13.30	Practice continued · individual advice	Practice
15.30	Wrap-up and follow-up plan	Discussion
16.00	End	