Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Department of Chemistry and Applied Biosciences
Laboratory of Organic Chemistry

Infochroma AG
Chräbelstrasse 4
6410 Goldau Switzerland

ETH Zurich
Mikail Levasseur
Senior scientist and lecturer
Vladimir-Prelog-Weg 1-5/10,
8093 Zurich, Switzerland
Phone: +41 44 633 42 01
mikail.levasseur@org.chem.ethz.ch

Zurich, May 1, 2026

Re: Letter of gratitude

Dear Alice, dear Sarah,

I am writing to express my sincere gratitude to Infochroma for sponsoring the course *Biological Chemistry B: New Proteins from Directed Evolution Experiments*, which took place from November 4 to 26, 2025.

This edition represented a complete renewal of the long-standing block course previously led by Prof. Peter Kast, who has shaped enzyme evolution projects for nearly 30 years. Last year, I decided to redesign the course around an innovative topic that is particularly meaningful to me: the evolution of protein cages for molecular therapeutic delivery. Given the novel nature of the project, substantial effort was invested in designing and optimizing experiments that would be both scientifically rigorous and pedagogically effective. Numerous preliminary tests were required to ensure feasibility and educational value.

The realization of these preparatory experiments was made possible thanks to the record-breaking support of 29 industrial partners. Infochroma was an important contributor, for which we are extremely grateful.

In the 2025 edition, students were exposed to the application and interpretation of data from a wide range of modern molecular and chemical biology techniques, including:

- Construction of gene libraries using PCR cloning
- Analytical and preparative agarose gel electrophoresis
- DNA fragment and plasmid purification
- Preparation of growth and selection media
- Restriction digestion and ligation
- Bacterial transformation (electroporation and heat shock)
- *In vivo* selection experiments
- Clone isolation and sequence analysis
- Expression using a T7 RNA polymerase system
- Preparative bacterial cultivation and protein purification by metal affinity and gel filtration chromatography
- BCA protein assays
- SDS-PAGE and native agarose gel electrophoresis
- Mass spectrometry
- Dynamic light scattering and thermal unfolding
- Mammalian cell culture
- Western blotting
- Immunofluorescence and confocal microscopy
- Transmission electron microscopy

Developing this new project also required a complete rewrite of the course script. The document now includes a scientific introduction to the research project, detailed daily objectives for all 14 learning days, safety information, and 35 comprehensive experimental protocols. The script was intentionally structured to teach students how to write a proper scientific report, including appropriate referencing, figure and table callouts, and well-formatted captions.

In recognition of the substantial commitment made by our sponsors, we ensured clear and meaningful visibility of your contributions throughout the course. Several examples (with some excerpts from the script provided in the following pages) include:

- Direct hands-on use of sponsored materials, reagents, consumables, and loaned instruments during experimental work
- A comprehensive “Materials and Reagents” table at the beginning of each protocol, specifying product name, description, supplier, catalog number, and storage or preparation notes. Beyond highlighting sponsor products, this format reinforces to students the importance of traceability and reproducibility in experimental science. The course script is frequently reused by students in later academic and professional settings, enabling them to replicate experiments using the same products encountered during the block course.
- A “Sponsorship Pyramid” figure illustrating relative contribution levels
- A dedicated table presenting each sponsoring company, its primary area of expertise, and the nature of its support
- Verbal acknowledgment of industrial partners during daily theory lectures

We recently learned that ETH students participating in the 2026 International Directed Evolution Competition selected protein cage evolution as their topic, and we are pleased to contribute as advisors. This development strongly suggests that the course inspires students well beyond its formal duration.

Student feedback was exceptionally positive. Participants described the course as “awesomely organized,” “a truly illuminating experience,” and “the best block course I have attended.” Several emphasized its long-term educational impact, noting that they “learned a lot for [their] future,” that it was “a very educational experience—much more than in other block courses,” and that it covered “essential skills for [their] future scientific career.” The relevance of the project was particularly appreciated, with one student remarking that “it felt like our work actually had a purpose.” Others highlighted the breadth of techniques and the clarity of the script, as well as the collegial and motivating atmosphere throughout the intensive schedule. An unsolicited student feedback email is included on the following pages.

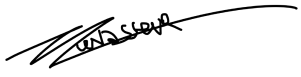
The positive atmosphere was further reinforced by the numerous giveaways and prizes distributed during theory lectures to recognize scientific achievements. Thanks to the outstanding commitment of our sponsors in providing high-quality merchandising materials, we created creative and engaging awards, often with playful and scientifically themed names. A list of awarded prizes is included in the following pages.

We were extremely satisfied with the success of the 2025 edition of the block course on protein cage evolution. Despite my strong motivation to continue teaching—and a proposal submitted to ETH to expand the format to a seven-week course offered twice per year instead of the current 3.5-week format once per year in the Fall semester, allowing the integration of additional experimental modules (including more chromatography techniques), the implementation of more advanced experiments, and further enhancement of student training—ETH has decided not to extend my contract after Prof. Kast’s retirement in June and, consequently, to discontinue the block course. Both Prof. Kast and I find this decision extremely regrettable.

Thank you once again for Infochroma’ substantial support. This course would not have been possible without your contribution.

With best regards,

Mik Levasseur



Protocol T – Liquid-chromatography mass spectrometry (LC-MS)

Table 79. Materials and reagents required for LC-MS measurements. Item names, short description, commercial source, and associated notes are listed in the first, second, third, and fourth column, respectively.

Item	Description	Source	Notes
Methanol	Solvent used in chloroform/methanol protein precipitation	Sigma-Aldrich #34885	Stored at room temperature, tightly sealed; flammable, thus handle in fume hood
Chloroform	Organic solvent used in protein precipitation	Sigma-Aldrich #366927	Stored at room temperature in a ventilated cabinet; toxic, thus use only in fume hood with PPE
Formic acid	Used to resuspend dried protein pellet prior to LC-MS analysis	Sigma-Aldrich #27001	Stored at 4 °C after opening, tightly closed; corrosive, thus handle in fume hood
Vials	Polypropylene vials for LC-MS sample injection	Infochroma #8F02-SC-PP1µ	Stored at room temperature
Vial lids	Screw caps with septa to seal LC-MS vials	Infochroma #8003-SC-Te	Stored at room temperature

Sample preparation (chloroform/methanol precipitation)

i. In a 1.5 mL Eppendorf tube, prepare 200 µL of a 2 µM protein sample in cage storage buffer
ii. Add 480 µL methanol (CH_3OH) and 160 µL chloroform ($CHCl_3$)
iii. Vortex briefly
iv. Open the tube cap to avoid pressure buildup
v. Add 640 µL mQ H_2O and vortex briefly
vi. Centrifuge for 1 min at 20,000 x g
vii. Two phases should form; carefully remove the upper aqueous phase, leaving ~1 mm above the interface to avoid disturbing the lower organic/protein phase
viii. Add 480 µL methanol and vortex briefly
ix. Centrifuge for 5 min at 20,000 x g; ensure consistent tube orientation (e.g., hinge towards axis)
x. A protein pellet should form (may be invisible due to low sample amount)
xi. Decant the liquid carefully, opposite to where the pellet is expected
xii. Invert the tube on a paper towel and allow residual liquid to evaporate completely
xiii. Add 20 µL of 0.1% formic acid to resuspend the pellet
xiv. If no pellet is visible, pipette up and down along the tube walls to recover adsorbed material
xv. Transfer the resuspended sample to a glass vial; avoid air bubbles
xvi. Prepare a blank vial containing 20 µL 0.1% formic acid (control)

Instrument information

Model: Bruker Compact 1
Location: HCI E 337
Sample types: Intact proteins, intact antibodies, peptides, tryptic digests
Ionization method: Electrospray Ionisation (ESI)
Modes: MS, MS/MS (CID)
Analyzer: Quadrupole Time-of-Flight (Qq-TOF)
m/z Range: 100–10,000
Separation: LC (C18, C4 columns available)
Detector: UV/Vis Diode Array (DAD)

Industrial sponsors for consumables

The success of the 2025 Biological Chemistry B block course is made possible through the generous contributions of numerous industrial partners. In total, 29 companies (**Figure 23**) provided reagents, consumables, instruments, or financial support (**Table 48**), representing a combined contribution exceeding 52,000 CHF.

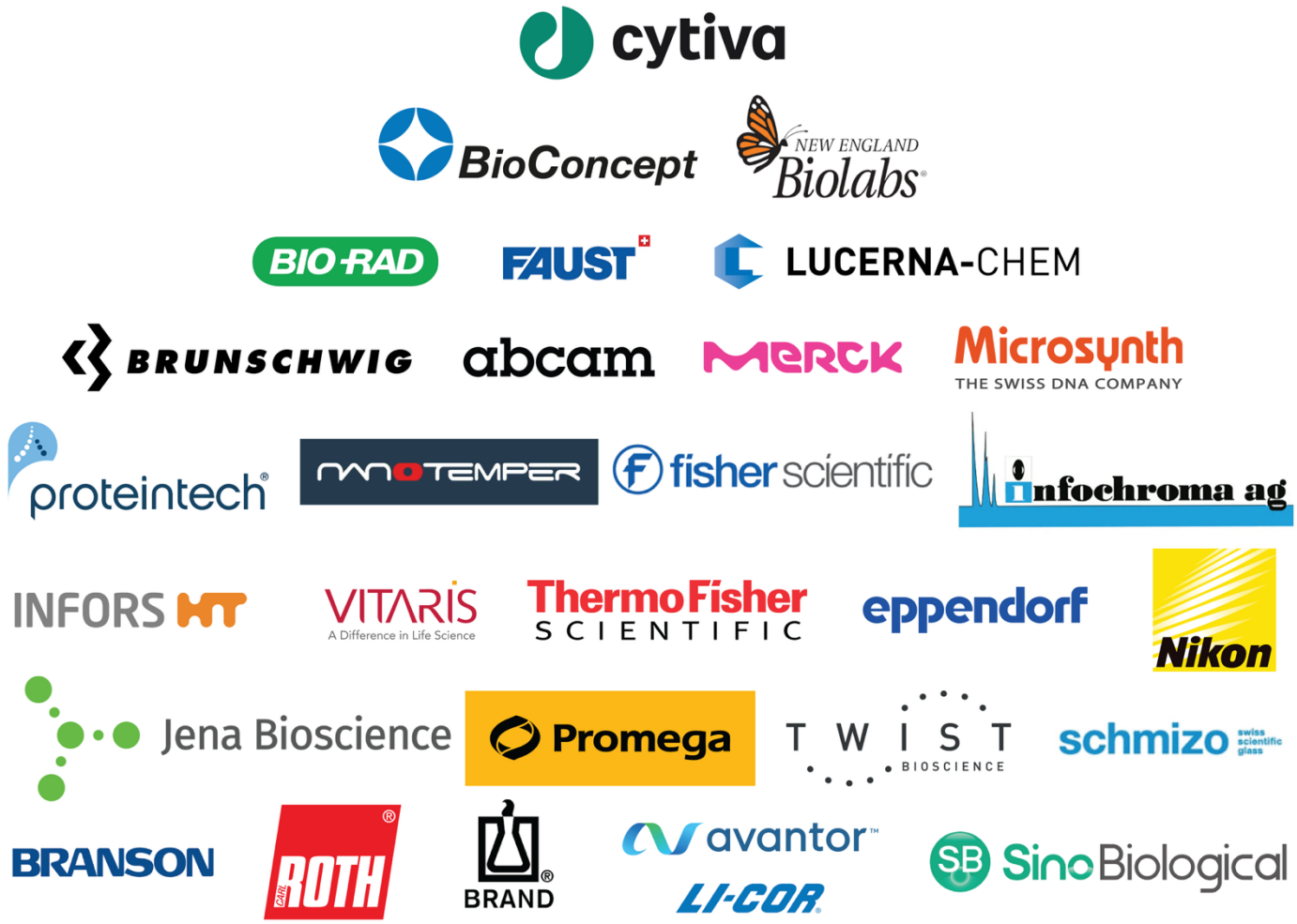


Figure 23. Sponsorship pyramid for the 2025 Biological Chemistry B block course. The pyramid illustrates the relative contribution levels of the 29 sponsors supporting the BCP25 block course. Sponsors are arranged from top (major contributors) to base (supporting contributors) according to their total financial or in-kind support. The most substantial contributions were provided by Cytiva (> CHF 9,000), BioConcept and New England Biolabs (> CHF 7,000), and Bio-Rad (> CHF 4,000), followed by Lucerna-Chem, Faust, Brunschwig, Merck (each > CHF 3,000). Abcam and Microsynth each contributed over CHF 2,000, while Proteintech, Fisher Scientific, and Eppendorf provided support exceeding CHF 1,000. All contributions were instrumental in establishing the course and implementing this year's new project after an extended preparation phase. We are deeply grateful to all partners for their generosity, enthusiasm, and constructive engagement. Special thanks go to NanoTemper, who provided a Prometheus Panta instrument for the final experimental day and will actively support students during data acquisition and analysis. The feasibility of several experiments was also made possible through the equipment loans from Merck (Scepter 3 cell counter) and Bio-Rad (TurboBlot transfer system). Additionally, Brand ensured that all student groups had access to pipetting aids, streamlining liquid-handling procedures. The collaboration with Brand was made possible through the initiative of Fisher Scientific.

Table 48. Industrial partners supporting the BCP25 block course. Each company (sorted alphabetically), along with its primary area of expertise and the type of support provided, is detailed below. Most reagents and materials were generously donated free of charge (100% discount), while others were offered at significant academic discounts or provided through temporary equipment loans. All contributed items were either directly used by students during the block course or employed by TAs for preparatory work. Several companies also kindly provided giveaways and prizes to recognize students' scientific achievements and foster a collegial atmosphere in the laboratory.

Company	Sector / Expertise	Contribution	Support Type
Abcam	Global antibody and detection reagent manufacturer providing immunoassay and imaging products	Anti-Neuropilin 1 and β-Actin antibodies, anti-His Alexa Fluor 647 antibody, Hoechst 33342, Phalloidin-iFluor 488, InstantBlue Coomassie stain	100% discount
Avantor / VWR	Global provider of laboratory consumables, safety equipment, and glassware	Disposable lab coats, 2 L SuperDuty Duran Erlenmeyer flasks (2 pieces)	100% discount
Bio-Rad	Developer of electrophoresis, Western blotting, and protein analysis systems	Protein standards, buffers, gels, transfer packs, and consumables; loan of Turbo Blot transfer instrument	100% discount + instrument loan
BioConcept	Swiss manufacturer of customized cell culture media, buffers, and sterile reagents for molecular and cellular biology	Fetal calf serum (heat-inactivated), Ham's F12K, DMEM high glucose, PBS, Trypsin-EDTA, glutamine, PBST, BSA, RIPA buffer, formaldehyde, PMSF, TBST	100% discount
Brand	German-based company specializing in laboratory liquid-handling equipment, life-science consumables and general lab instruments	Filter tips, Brand Accu-Jet S	100% discount + loan of pipetting aids
Branson Ultrasonics	Specialist in ultrasonic processing and cell disruption systems	Rosette cell device for sonication	100% discount
Brunschwig AG	Swiss supplier of molecular biology reagents and liquid-handling consumables	Tetracycline, IPTG, tips, microtubes, serological pipettes, single and multichannel pipettes, BluCapp tubes, MgATP	100% discount
Carl Roth	European supplier of laboratory chemicals, reagents, and general consumables	Financial contribution toward consumables	200 CHF donation
Cytiva	Specialist in chromatography, filtration, and protein purification systems for bioprocessing and life sciences	Ni Sepharose HP, PD-10 and PD MiniTrap columns, syringe and centrifugal filters, ECL Plex antibodies, Superose 6 Increase column, cell culture media and supplements	100% discount
Eppendorf	Global manufacturer of precision laboratory instruments and plastic consumables	Pipettes, tips, tubes, UVettes, Combitips, Deepwell plates	100% discount
Faust	Supplier of laboratory plastics and consumables for routine biological research	Cryo tubes, centrifuge tubes, pipettes, racks, wash bottles, pipet tips, disposal containers, roller mixer	100% discount
Fisher Scientific	Global supplier of laboratory equipment and consumables	Rosette cell device, Amicon ultra-15 centrifugal filters, disposable coats, gloves	100% discount
InfoChroma	Provider of chromatography consumables and laboratory safety supplies	HPLC syringes, vials, PTFE caps, nitrile gloves, spray bottles, storage boxes	100% discount
Infors HT	Manufacturer of laboratory shakers, incubators, and accessories for microbial and mammalian cell culture	Sticky Stuff 2.0 green mats for shaker platforms	100% discount
Jena Bioscience	Developer of reagents and kits for mutagenesis, cloning, and DNA manipulation	JBS error-prone PCR kit	60% discount
LI-COR Biosciences	Manufacturer of advanced imaging systems supporting applications ranging from traditional Western blot detection to three-dimensional cell models and whole-animal imaging	Western blot incubation boxes (20 units)	100% discount
Lucerna-Chem	Distributor of molecular biology reagents and purification kits	LB-media, Zymo Research DNA purification kits, DNase I, RNase A, plating beads	100% discount
Merck	Global supplier of chemicals, analytical kits, cell lines, and reagents for molecular and cell biology	A549 and HEK293 cells, protease inhibitors, nucleases, BCA protein assay Kit, imidazole, Triton X-100, phosphate buffers, and loan of a Scepter 3 cell counter with sensors	85–90% discount and instrument loan
Microsynth AG	Swiss provider of DNA sequencing, oligonucleotide synthesis, and molecular biology services	Barcode Economy Run Service, Barcode *E. coli* NightSeq Run Service, custom oligonucleotides	100% discount

Table 48 (continued). Industrial partners supporting the BCP25 block course. Each company (sorted alphabetically), along with its primary area of expertise and the type of support provided, is detailed below. Most reagents and materials were generously donated free of charge (100% discount), while others were offered at significant academic discounts or provided through temporary equipment loans. All contributed items were either directly used by students during the block course or employed by TAs for preparatory work. Several companies also kindly provided giveaways and prizes to recognize students' scientific achievements and foster a collegial atmosphere in the laboratory.

NanoTemper Technologies	Developer of instruments for biophysical protein characterization and stability analysis	Prometheus Panta instrument, capillaries, and on-site supervision for student measurements	100% discount + instrument loan + training
New England Biolabs (NEB)	Recombinant and native enzymes for molecular biology and genomics, offering PCR, cloning, and restriction enzyme technologies	T4 DNA Ligase, λ *Bst*EII and ΦX174 *Hae*III DNA markers, *Xba*I, *Xho*I, *Spe*I-HF, *Nco*I-HF, Supercoiled DNA Ladder, Q5 DNA Polymerase	100% discount
Nikon	Optical imaging and microscopy solutions for high-resolution fluorescence and confocal microscopy	Coverage of imaging costs for the use of the Nikon SoRa confocal microscope	100% coverage
Promega	Supplier of molecular biology and biochemistry reagents	TE buffer, EDTA, NaCl, ethidium bromide, PureYield Maxiprep kit	100% discount
Proteintech	Manufacturer of primary and secondary antibodies, detection reagents, and protein markers	Anti-NRP1/2, anti-GAPDH, recombinant antibodies, chemiluminescent substrates, blotting accelerators	100% discount
Schmizo AG	Supplier of advanced laboratory glassware	2 L SuperDuty Duran Erlenmeyer flasks (9 pieces)	100% discount
Sino Biological	Producer of recombinant proteins, antibodies, and cell lysates for biomedical research	Human Neuropilin-1 HEK293 overexpression lysate	100% discount
Thermo Fisher Scientific	Multinational life sciences and clinical research supplier, providing analytical instruments, specialty diagnostics, and laboratory reagents	Countess chamber slides, Trypan Blue solution	100% discount
Twist Bioscience	Synthetic biology company specializing in DNA synthesis and custom gene fragments	Gene fragments used for AaLS constructs	50% discount (no handling or shipping fees)
Vitaris	Supplier of advanced life science equipment and consumables	Ibidi µ-Slide 18 Well Glass Bottom	100% discount

Outlook

Biological Chemistry B

From Rüeger Luka Aleksi <lrueeger@student.ethz.ch>
Date Mon 05/01/2026 16:27
To Levasseur Mikail <mikail.levasseur@org.chem.ethz.ch>

Dear Mik,

I hope you had nice festive holidays and started well into your new year. I just wanted to let you know, after this semester, that the Biological Chemistry B blockcourse was by far the best that I attended. In no other course did I learn as much as I did in this one and I truly appreciate the amount of work and time that you and the team put into it. Thank you very much! As Prof. Kast put it in the first session, I really was the lucky one from UZH to get in. In due time I will be applying for the MSc Biological Chemistry at ETH, so we might cross paths again, but until then I wish you all the best.

Kind regards,
Luka Rüeger

List of prizes awarded during the 2025 edition of the block course

Award	Description	Prize
Welcome Package	Given to all groups on the first day of the block course	BioConcept/NEB starter pack, ThermoFisher magnetic clamp, BioConcept 2026 calendar, as well as various pens, pencils, markers, and notebooks
Pipetting Experts	Successful completion of the pipetting test	Eppendorf pens
PCR Master Amplifier Award	Awarded to the team that achieved the highest average DNA yield from their PCR reactions	TwistBioscience nucleobase socks
PCR Fragments Recovery Excellence Award	Awarded to the team that achieved the highest overall recovery rate across digestion and purification steps	TwistBioscience black socks
Sharp Eye Award (Digested PCR Fragments)	Awarded to the team that achieved the most accurate visual DNA quantification, with estimates most consistent with the assistants' computational analysis	Merck socks
Sharp Eye Award (Purified Acceptor)	Awarded to the team that achieved the most accurate visual DNA quantification, with estimates most consistent with the assistants' computational analysis	TwistBioscience black and purple socks
Vector Recovery Excellence Award	Awarded to the team that achieved the highest average DNA yield following restriction digestion and gel extraction of their acceptor vector	TwistBioscience black and orange socks
The Perfect Shock Award	Awarded for electroporation success, optimal time constants, and absence of arcing	Zymo bacteria-shaped cookie cutter
The Golden Colony Count Award	Awarded to the group achieving the best library–linker performance, yielding the highest colony count after background subtraction (Tet^+ / no salicylate control)	ThermoFisher computer bags with goodies + Cytiva water bottles
Crystal Ball of Cloning Award	Awarded for the best prediction of the library–linker pair yielding the highest colony number	"Crystal ball" (InfoChroma)
The Pour-fectionists Award	Awarded to the group whose LB-agar plate count most closely matched the expected 72.72 plates (calculated from 3 x 800 mL / 33 mL per plate)	BioConcept calendar + Genius Juice coffee cup
The Fit-tastic Award	Awarded to the team with the highest R^2 value in their BCA standard curve fit	Abcam goodie bag
The Consistent Concentration Cup (C3 Award)	Awarded to the team achieving the most consistent concentration values across all dilutions and triplicate measurements for both lysate samples	ThermoFisher computer bags with goodies + Cytiva water bottle
The Mega Miniprep Award	Awarded to the team that achieved the highest cumulative DNA yield from the 12 minipreps	Zymo socks
The Absolutely Totally Great C-quencing (ATGC) Award	Awarded to the team that achieved the best overall sequence quality	Nucleobase pins
The "No Marker, No Problem" Award	Awarded to Group #3 for precisely cutting their Western blot membrane into three sections despite invisible marker bands, due to an accidental triple loading of the 20-fold diluted protein standard	Faust cutting board
The Highly Radiant Protein (HRP) Detection Award	Awarded to the team with the highest-quality chemiluminescent Western blot	Proteintech alpaca plush
The Fantastically Luminous and Ultra Optimal (FLUO) Detection Award	Awarded to the team that achieved the highest-quality fluorescent Western blot	Proteintech alpaca plush
The BL21-Gold Standard Award	Awarded to the group obtaining the highest number of colonies after chemical transformation of *E. coli* BL21-Gold (DE3)	Abcam goodie bag
The E. coli Night Seekers Award	Awarded to the team that achieved the best overall *E. coli* NightSeq sequence quality	Abcam goodie bag
The Endless Read Award	Awarded to the group achieving the highest number of base-pair reads in a single sequence among selected clones	Abcam goodie bag
The Usain POLTS Award	Awarded to the group inducing both cultures first	Merck T-shirt

The A-out5t4ndin9 Cell Whisperers Award	Awarded to the group achieving the highest mammalian cell viability and lowest cell aggregation across all cell culture experiments	Ibidi Happy Cell plush + stickers + magnets
The Clairvoyance Award	Awarded to Group #2 for learning from past mistakes and avoiding loading a diluted ladder in their SDS-PAGE gel	Bio-Rad protein ladder tattoo
The Supreme Optical Resolution Award (SORA)	Awarded to the group that produced the most outstanding confocal microscopy images, as determined by a vote of the teaching assistants during the final presentation	Abcam Lego Antibody
The Supreme Optical Resolution Award (SORA) – Runner-up	Awarded to the group that produced the second most outstanding confocal microscopy images, as determined by a vote of the teaching assistants	InfoChroma small buildable microscope + UV lamp
The Steady N' Accurate in Labwork Award	Awarded to the group that clearly did not confuse speed with haste when culturing mammalian cells	SinoBiological snail plush + stickers
The Precision Proteomics Award (Overall Winner)	Awarded to the group that demonstrated exceptional skill in preparing LC-MS samples and observed a mass closely matching their protein of interest	InfoChroma aperitif set
The Precision Proteomics Award (Runner-up)	Awarded to the group that demonstrated exceptional skill in preparing LC-MS samples and observed a mass closely matching their protein of interest	Merck ethanol mugs + IGZ bottle opener
Guardians of the Luxurious Broth Award	Awarded to the group keeping all three LB medium bottles completely uncontaminated	BioConcept beach towel
The Outstanding Participation Award	Awarded to the group that demonstrated exceptional engagement throughout the course	Merck collaboration cups + Eppendorf pens
I Played with T7 & Got Pure Protein ("IPTG Pure Protein") Award	Awarded to the group that achieved the highest protein purity	Abcam goodie bag
The Master EsTEMator Award	Awarded to the team with the smallest standard deviation in cage size estimation, provided the average diameter was within the expected range	IGZ measuring tape + "The Platonic Bodies" (InfoChroma)
The Assistants' Library Headache Award	Awarded to the group that successfully carried out experiments on the most challenging library of the block course	Magnets + Zymo bacteria-shaped cookie cutter + Biology mugs (InfoChroma)
Shake It Until You Make It Award	Awarded for producing beautifully monodisperse Neg cages carrying five mutations per monomer while maintaining an excellent A260/A280 ratio of 0.8, despite late induction (OD600 = 1) and the lowest yield of the class (0.555 mg/L)	Lego Multitrons
The Ab5olute F4stest at Cell Splittin9 Award	Awarded for demonstrating exceptional speed in mammalian cell culture	InfoChroma magnetic sand timer + stickers
The MAsterp1Ɛce Award	Awarded to the team with the most promising AaLS-13 mutant, demonstrating excellent purity, beautifully resolved pentameric subunits, and outstanding thermostability	InfoChroma Evolution mugs + magnets