

2025 Redox Chemistry / Biochemistry Graduate Summer Course



Program and information



Welcome to the 2025 Redox Chemistry / Biochemistry Graduate Summer Course!

University of Debrecen, 10 – 14 June 2025.

We are pleased to announce that the 2025 Redox Chemistry / Biochemistry Graduate Summer Course will be hosted by the University of Debrecen from 10 – 14 June 2025.

This well-established educational event has been a prominent forum for presenting the latest scientific results in redox chemistry and biochemistry.

The course in 2025 is particularly significant for us, as the **University of Debrecen** is joining organizing institutions for the first time, alongside world-renowned partners, such as the **University of Nebraska-Lincoln (UNL)**, the **Medical University of South Carolina (MUSC)**, and the **Karolinska Institutet** in Stockholm, Sweden.

The program entails a series of lectures from Hungarian and international experts on redox biology. The participants include lead investigators of the field of redox biology and outstanding PhD students on the partner institutions.

We are honoured to announce that Prof. Elias Arnér, PhD, MD, the director of the Karolinska Institutet Cancer Network and the head of the Selenoprotein Research Group of the National Institute of Oncology in Budapest, Hungary, will give an open lecture in the framework of the course, which every interested listeners are welcome to attend.

The open lecture will take place at **13:00 (CEST) on 10th June 2025 (Tuesday)**.

Venue: University of Debrecen Learning Center 0.14 (4032 Debrecen, Egyetem sqr. 1).

For the organization of the course, project no. MEC_SZ 149205 has been implemented with the support provided by the Ministry of Culture and Innovation of Hungary from the National Research, Development and Innovation Fund, financed under the MEC_24 funding scheme.

During the course, we are organizing the SFRR-E Young Investigators' Satellite Day, at the Mád Wine Academy (Mád, Hungary), with the support of the Society for Free Radical Research Europe.

We intend to promote new research collaborations, inspire scientific exchanges and strengthen the links between international research establishments within the redox biology community.

We are looking forward to greeting our guests in Debrecen!

On behalf of the organizing committee,

Prof. Peter Nagy, DSc.



NATIONAL RESEARCH, DEVELOPMENT
AND INNOVATION OFFICE
HUNGARY

PROJECT
FINANCED FROM
THE NRDI FUND

Society
for Free
Radical
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Europe

NATIONAL TUMOR BIOLOGY LABORATORY



UNIVERSITY OF DEBRECEN

MUSC
Medical University
of South Carolina

UNIVERSITY OF
Nebraska
Lincoln

Karolinska
Institutet

REDOX

CHEMISTRY / BIOCHEMISTRY GRADUATE SUMMER COURSE

DEBRECEN 2025 UNIVERSITY OF DEBRECEN

Open lecture:

PROFESSOR ELIAS ARNÉR (Karolinska Institutet)

SELENIUM AND SELENOPROTEINS IN HUMAN HEALTH AND DISEASE



10 JUNE – LEARNING CENTER 0.14 13:00

10–14 JUNE

Main organizer: Prof.
Péter Nagy, DSc



- ✓ Presentations / exam
- ✓ Leisure Activities
- ✓ Networking Opportunity

VISIT OUR WEBSITE

Find more at
www.chemcoord.unideb.hu

Welcome To Debrecen

Debrecen is Hungary's second largest city. It is located east of Budapest, in the Northern Alföld, a region which, when it comes to geothermal resources, is Hungary's richest. A mere two-hour drive from the capital via the new motorway, it also boasts one of the country's few international airports.

About Debrecen

The city has served as the nation's capital twice, in 1849 and at the turn 1944-45, respectively. Each time represented dramatic episodes of revolution and war, when the Great Church and the College became iconic venues of momentous historic occasions. Today, Debrecen exudes the feel of a pleasant provincial town with its colorful piazzas and spacious parks. At the same time, it also serves as Eastern Hungary's commercial, administrative, cultural, and educational center.

The presence of the university with a student population of 30 thousand, including thousands of multinational students, lends a cosmopolitan atmosphere to the city. This is further accentuated by international sporting and cultural events. In addition to the internationally renowned annual Debrecen Flower Parade on August 20, the whole year is packed chock-full with boisterous festivals of cultural and gastronomic interest. However, the city is large enough to fully accommodate those who would rather get away from it all and find safe havens devoid of the noise of weekdays.



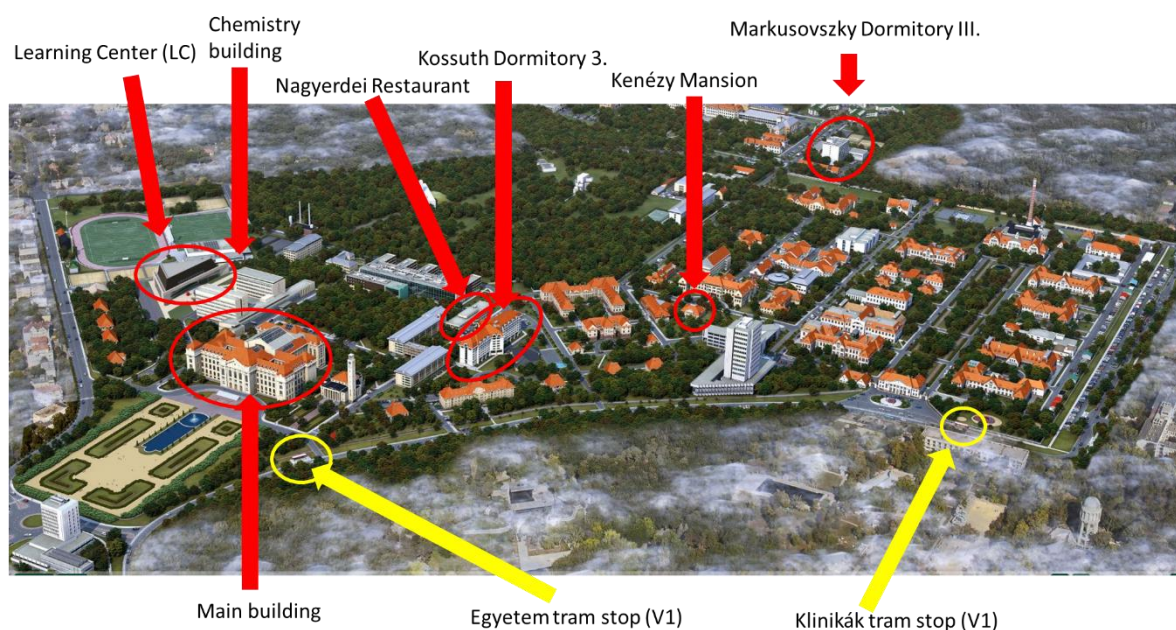
Venues

University of Debrecen Main Campus

4032 Debrecen, Egyetem tér 1.

Digital map of the Main Campus:

<https://debrecen.hostexp.com/>



- | | |
|-------------------------------------|-------------------------|
| • Learning Center | Lectures |
| • Nagyerdei Restaurant | Breakfast and lunch |
| • Kenézy Mansion | Poster session |
| • Chemistry Building | Exam (K/1 lecture hall) |
| • Lajos Kossuth Dormitory III. | Accommodation |
| • Lajos Markusovszky Dormitory III. | Accommodation |

Address: 4032 Debrecen, Móricz Zsigmond körút 22.

Off-campus sites:

- | | |
|--------------------------------------|----------------------|
| • Régi Vigadó Resturant | Welcome dinner |
| • Aquaticum Thermal & Wellness Hotel | Accommodation |
| • Mád Wine Academy, Borsay Castle | Student presentation |

Schedule

Tuesday, 10 June – Learning Center 0.14

8:30 – 9 Introduction

Péter Nagy, Elias Arnér, Oleh Khalimonchuk, Danyelle M. Townsend, Kenneth D. Tew

9 – 10 Redox cycling and basic principles of redox biochemistry
Elias Arnér (Karolinska Institutet)

10 – 10:15 Coffee break

10:15 – 11:15 Oxidative stress, introduction to the concept
Oleh Khalimonchuk (University of Nebraska – Lincoln, Redox Biology Center)

11:15 – 12 The thioredoxin system
Ed Schmidt (Montana State University)

12 – 1 pm Lunch – Nagyerdei Restaurant

1 – 2 Selenium and selenoproteins in human health and disease
Elias Arnér (Karolinska Institutet)

Open lecture at 0.14 of the Learning Center

2 – 2:45 Glutaredoxins

Lucia Coppo (Karolinska Institutet)

2:45 – 3 Coffee break

3 – 3:45 Oxygen and blindness of premature newborns

György Balla (University of Debrecen)

3:45 – 4:30 Reductive stress

Kenneth D. Tew (Medical University of South Carolina)

4:30 – 5 Persulfidation in redox biology

Éva Dóka (National Institute of Oncology)

7:00 – Welcome dinner

Régi Vigadó Restaurant (4032 Debrecen, Nagyerdei Park 1.)



2 – 3 Mouse models for redox studies

Ed Schmidt (Montana State University)

3 – 3:15 Coffee break

3:15 – 4 Realigned transsulfuration in cancer models

Péter Nagy (University of Debrecen / National Institute of Oncology)

4 – 4:45 Application and limitations of tools for redox analysis in live cells

Karoline Scholzen (Karolinska Institutet)

4:45 – 5:30 Recent developments in recombinant selenoprotein studies

Qing Cheng (Karolinska Institutet)

Thursday, 12 June

SFRR-E Young Investigators' Satellite Day

Venue: Mád Wine Academy, Mád, Hungary; Borsay-castle

<https://madiborakademia.hu/en/borsay-castle>



7 – Bus leaves to Mád

9:15 – 10 Glutathione homeostasis and GST

Kenneth D. Tew (Medical University of South Carolina)

10 – 10:45 Metals and redox stress

Jaekwon Lee (University of Nebraska – Lincoln)

10:45 – 11:30 Trace elements and redox signaling

Anna Kipp (Friedrich Schiller University Jena)

12 – 1 pm Lunch – Kúria Hotel Mád, Conference Center

1 – 1:45 Vascular calcification - What the clinician sees and does
József Balla (University of Debrecen)

1:45 – 2:30 Integration of Signaling Pathways: Free Radical, Protein
Phosphorylation and Steroids in Carcinogenesis
Ming-Fong Lin (University of Nebraska Medical Center)

2:30 – 2:45 Coffee break

2:45 – 5:15 Student presentations

Péter Nagy (University of Debrecen / National Institute of Oncology)

This event is supported by the Society for Free Radical Research – Europe



Topics and questions for student presentations

Group 1 - Thiol redox systems			
First Name	Family name	Affiliation	Questions / viewpoints
Rachelle	Nelson	UNL	1. What is the function of thioredoxin? How many thioredoxin isoforms are in humans and where are they localized in the cell? Describe the structure of thioredoxin. Name at least three protein targets of thioredoxin. 2. What is the function of glutaredoxin? How many glutaredoxin isoforms are in humans and where are they localized in the cell? Describe the structure of glutaredoxin. Name at least three protein targets of glutaredoxin. 3. Describe the enzyme systems responsible for recycling thioredoxin and glutaredoxin by showing the structures and catalytic mechanisms. Where are these recycling enzymes localized in mammalian cells? In plants? 4. Describe the biosynthesis pathway for glutathione and the system for maintaining the intracellular GSH/GSSG ratio. What are the concentrations of glutathione in different intracellular compartments (e.g., cytosol, mitochondria, endoplasmic reticulum). How is glutathione imported into cells?
Katalin Fruzsina	Magi	UD	
Daniella	Dörgő	NIO	
Bohdana	Sokolova	KI	
Thomas	Dempster	MUSC	
Balázs	Gombos	UVMB	

Group 2 - Metals and Trace Elements in Redox Biology			
First Name	Family name	Affiliation	Questions / viewpoints
Emma	Bergmeyer	UNL	1. Which metals are the major contributors to hydroxyl radical formation in cells? What are the intracellular concentrations of these metals in mammals? Show the reaction by which these metals catalyze the formation of hydroxyl radicals. Provide an example of how mammalian cells import/export metals?
Yuchao	Ding	UD	

Martina	Serrano-Alvarez	US	- How do mammalian cells import/export metals? How are import/export systems used to protect against stress? Provide specific examples. - Give an example of a metalloprotein that is involved in oxygen or redox sensing? Describe the mechanism of response. - Give some examples on how Zinc, Copper and Iron are linked to different redox processes in cells. - Give four examples each of selenoproteins from bacteria, archaea and eukaryotes, as well as cysteine orthologues of each of these selenoproteins from other organisms. Provide some hypotheses on why or how selenoproteins have evolved, and why not all organisms have them.
Andrea Cecília	Badari	UVM B	
Mattia	Pantalone	KI	

Group 3 – Redox regulation			
First Name	Family name	Affiliation	Questions / viewpoints
Brett	Hilbers	UNL	- Describe the mechanism by which OxyR responds to hydrogen peroxide and regulates gene expression. Include structures if available. Describe at least five genes regulated by OxyR. - Describe the mechanism by which Yap1p is involved in the response to oxidative stress in <i>S. cerevisiae</i>. What target genes are activated by Yap1p? - Describe the Keap1-Nrf2-ARE signaling pathway. How does it help cells respond to oxidative stress? What genes are regulated by this system?
Njomza	Gashi	UD	
Viola	Varga	SU	

Alexander	van Deventer	KI	4. Give at least four levels of redox control that affect cellular responses to insulin.
Kathleen	Klinzing	MUSC	

Group 4 – Oxidative Stress and Antioxidant Enzymes

First Name	Family name	Affiliation	Questions / viewpoints
Adedotun	Adefolalu	UNL	- How many superoxide dismutase (SOD) genes are in <i>E. coli</i>, <i>B. subtilis</i>, <i>S. cerevisiae</i>, and humans? What metal cofactors are utilized by the different SODs and where are the SODs localized? Describe the overall reaction catalyzed by SOD. Does SOD have a role in redox signaling? If so, how? - How many catalase genes are in <i>E. coli</i>, <i>B. subtilis</i>, <i>S. cerevisiae</i>, and humans? What cofactor does catalase require? Where are the different catalase enzymes localized? Are there any diseases or phenotype associated with lack of catalase? - How do peroxiredoxins protect cells against oxidative stress? Describe the reaction catalyzed by peroxiredoxin. Where are peroxiredoxins localized in mammalian cells? Do peroxiredoxins have a role in redox signaling? If so, how? - What are the biochemical functions of glutathione peroxidases? Describe the reaction catalyzed by glutathione peroxidase. Where are glutathione peroxidases localized in mammalian cells? - Describe DNA and lipid modifications that are found in cells exposed to oxidative stress agents? How do these modifications affect cell viability and contribute to disease progression? - What are some of the most common protein modifications that occur under oxidative stress? Describe how oxidative modification of SOD is associated with a disease. - How do cells repair oxidatively damaged DNA and proteins? Describe a specific example of one DNA and one protein repair enzyme.
Kristóf	Gui	UD	
Maja	Mikolás	UD	
Krisztina	Veszelyi	SU	
Kia	Liermann-Wooldrik	UNMC	
Linglong	Huang	KI	

Group 5 – Reactive sulfur species in redox biology			
First Name	Family name	Affiliation	Questions / viewpoints
David	Obe	UNL	1. Describe sources of biological sulfur. Briefly present metabolic routes of amino acids cysteine and methionine. 2. Mention some pathophysiological roles of transsulfuration enzymes in cancer models and metabolic diseases (i.e. homocystinuria) 3. Reactive sulfur species arising from cysteine metabolism. Give 3 examples for the biological roles of H₂S and/or cysteine persulfidation. What is the role of selenoproteins in the metabolism of persulfide species. 4. How RSS may contribute to mitochondrial bioenergetics?
Katalin	Sikura	UD	
Zoe	Seaford	MSU	
Xueping	Jiang	KI	
Kathryn	Glorioso	MUSC	
Avia	Simmons	MSU	

5:15 – 7 Wine tasting with English guide

7:15 – Bus leaves to Debrecen

Friday, 13 June – Learning Center 0.14

8:30 – 9:15 Nitric Oxide signaling

Danyelle M. Townsend (Medical University of South Carolina)

9:15 – 10 Iron-sulfur cluster proteins and redox regulation

Limei Zhang (University of Nebraska-Lincoln)

10 – 10:15 Coffee break

10:15 – 11:00 Oxidative stress-inducing bacterial metabolites regulating breast cancer behavior

Péter Bay (University of Debrecen)

11 – 11:45 Using stable sulfur isotopes for tracking redox metabolism

Colin Miller (Panosome GmbH, Heidelberg)

12 – 1 pm Lunch – Nagyerdei Restaurant

Afternoon session

Room: Learning Center 2.13

1-2 Peroxidasin: a link between reactive oxygen species and extracellular matrix

Miklós Geiszt (Semmelweis University, Budapest)

2 – 2:30 Coffee break

2:30 – 3:30 Career discussion (PN, EA, OK, DT, KT)

Péter Nagy, Elias Arnér, Oleh Khalimonchuk, Danyelle M. Townsend, Kenneth D. Tew

3:30 – 5 Study time with teacher availability

5 – 8 Poster session

5 – 6.30 Posters with odd numbers

6.30 – 8 Posters with even numbers

Venue: Kenézy Mansion – Professors' Club



List of posters

	Presenting author	Title of poster
1	Daniella Dörgő	Potential Protective Effect of Hydrogen Sulfide and Persulfidation Against Overoxidation of Peroxiredoxin 2
2	Katalin Sikura	Hydrogen sulfide as an anti-calcification stratagem in human aortic valve: Altered biogenesis and mitochondrial metabolism of H ₂ S lead to H ₂ S deficiency in calcific aortic valve disease
3	Erzsébet Zavaczki	Ferryl hemoglobin generated by hemoglobin oxidation inhibits osteoclastic differentiation of macrophages in hemorrhaged atherosclerotic plaques
4	Bohdana Sokolova	Above-Filter Digestion Proteomics (AFDIP) identifies drug targets and estimates ligand binding site
5	Alexander van Deventer	Chronic inflammation in skeletal muscle induces ER stress and activation of the IRE1a pathway
6	Xueping Jiang	The Anti-Tumor Efficacy of TXNRD1 Inhibitor and Selenium via STAT3 Pathway on Cancers
7	Linglong Huang	title tba
8	Balázs Gombos	Study of glutathione- and thioredoxin-reductase function in mouse hepatoma cells
9	Andrea Cecília Badari	Working Redox Biology: From Mouse Models to Liver Tumors
10	Zoe Seaford	shared poster with Martina Serrano Álvarez
	Martina Serrano Álvarez	Conversion of Cystine Into Cysteine Via Biochemical Reactions Using WT or TR/GR-Null Liver Models
11	Rachelle Nelson	The Protective Role of Neddylation in the Vascular Endothelium
12	Emma Bergmeyer	Mitochondrial protein Afg1 and its role in human health and aging

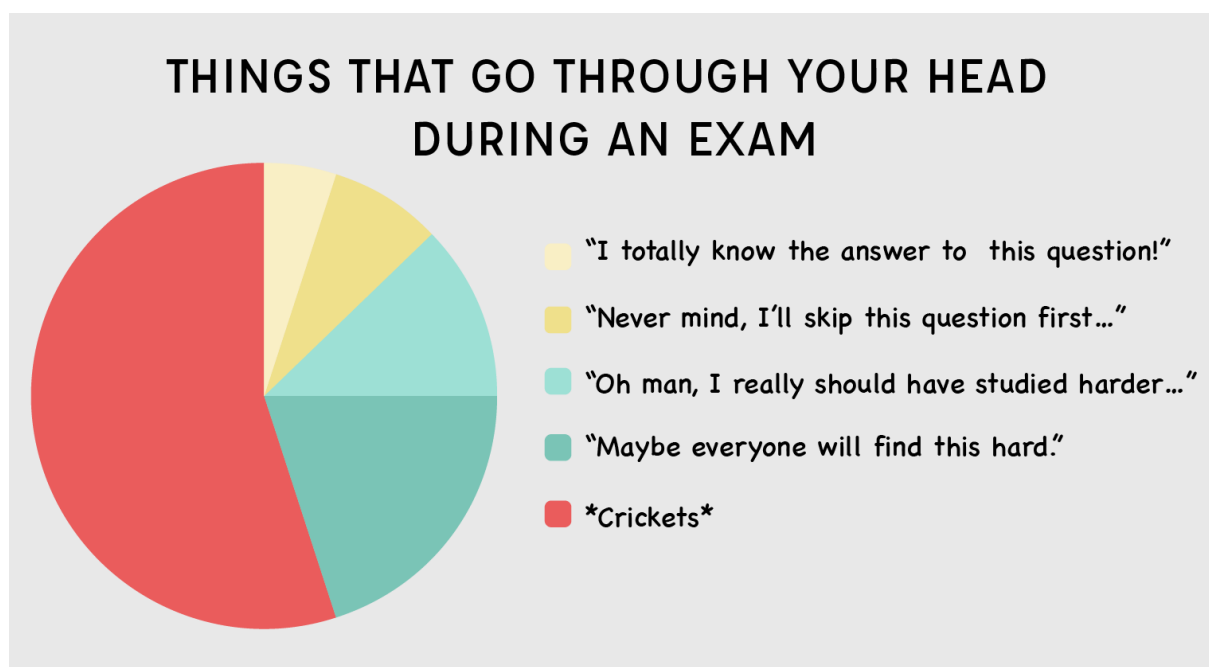
13	Brett Gehrig Hilbers	Crosstalk Between Ubiquitin-Proteasome System and Protein Quality Control in Mitochondria
14	Kia Liermann-Wooldrik	Radiation-induced adipose tissue dysfunction drives cancer migration
15	Adedotun Adefolalu	Investigating Complex Formation, Substrate Channeling, and Redox Regulation in Proline Catabolism in <i>Thermus thermophilus</i>
16	David Obe	Structural Insights into the Engineered Oxygen-Tolerant THI4 Metallozymes for Enhanced Efficiency Under Sulfur-limiting Conditions
17	Kathleen Klinzing	Inhibition of JNK with Inhibitor SP600125 Induces Memory Surface Markers on T lymphocytes in vitro
18	Thomas Dempster	RNA Expression Profiles of CD8+ T-cells Post-MI
19	Kathryn Glorioso	Regulation of PTEN Oxidation and Akt signaling by Peroxiredoxins in β -Cells.
20	Viola Varga	shared poster with Krisztina Veszelyi
	Krisztina Veszelyi	Endoplasmic Reticulum Redox Homeostasis - the Potential Absence of the Thioredoxin / Thioredoxin Reductase System in the Lumen
21	Beáta Biri-Kovács	Control of transcription factor regulation through the selenium-dependent thioredoxin system
22	Zsuzsanna Pató	A simple method to detect trace-amount of catalase impurity in purified recombinant peroxiredoxin 2
23	Attila Andor	Catalase Free Recombinant Peroxiredoxin 2 Production and Purification from <i>E.coli</i>
24	Mohanraj Mahendrarvarman	Thioredoxin-related Protein of 32 kDa (TXNL1) modulates p62 function upon auranofin treatment as it is rapidly degraded by the proteasome system without being ubiquitinated
25	Attila Kolonics	Role of TXN1 Gene in Redox Buffering Capacity in HEK-293T Cells
26	Mattia Russel Pantalone	Cytomegalovirus induces oxidative stress, inflammation and DNA damage in Glioblastoma

Saturday – 14 June

8.30 – 12 Study time with teacher availability

12 – 1 pm Lunch – Nagyerdei Restaurant

1 – 3 pm **Exam** – Chemistry Building, K/1 lecture hall



3 – 6:30 pm Free time

6:30 – Drinks and awards

Teniszke Sports and College Pub

4032 Debrecen, Dóczy József u. 9.

Participating institutions

UD	University of Debrecen
CCI	Chemistry Coordination Institute
KI	Karolinska Institutet
MBB	Dept. of Medical Biochemistry and Biophysics
UNL	University of Nebraska, Lincoln
RBC	Redox Biology Center
UNMC	University of Nebraska Medical Center
MUSC	Medical University of South Carolina
NIO	National Institute of Oncology
UVMB	University of Veterinary Medicine Budapest
HUN-REN	Hungarian Research Network
SU	Semmelweis University
HUSS	Hungarian University of Sports Science
FSUJ	Friedrich Schiller University Jena
MSU	Montana State University
	Panosome GmbH, Heidelberg

List of participants

Name	Affiliation
Adedotun Adefolalu	UNL
Alexander van Deventer	KI
Andrea Cecília Badari	UVMB HUN-REN
Andrea Domán	NIO MITO
Anett Jávör	UD CCI
Anna Kipp	FSUJ
Attila Andor	NIO Selenoprotein
Attila Kolonics	NIO Selenoprotein
Avia Simmons	MSU
Balázs Gombos	UVMB HUN-REN
Beáta Biri-Kovács	NIO Selenoprotein
Bohdana Sokolova	KI
Brett Gehrig Hilbers	UNL
Colin Miller	Panosome Gmbh
Daniella Dörgő	NIO MITO
Danyelle M. Townsend	MUSC
David Obe	UNL
Dávid Pethő	UD
Edward E. Schmidt	MSU UVMB HUN-REN

Elias Arnér	KI MBB NIO Selenoprotein
Emma Bergmeyer	UNL
Erzsébet Zavaczki	UD
Éva Dóka	NIO MITO
György Balla	UD
Jaekwon Lee	UNL
József Balla	UD
Karoline Scholzen	KI
Katalin Fruzsina Magi	UD
Katalin Sikura	UD
Kathleen Klinzing	MUSC
Kathryn Glorioso	MUSC
Kenneth D. Tew	MUSC
Kia Liermann-Wooldrik	UNMC
Kristóf Kui	UD
Krisztina Veszelyi	SU
László Potor	UD
László Virág	UD
Limei Zhang	UNL
Linglong Huang	KI
Lucia Coppo	KI
Maja Mikolás	UD

Martina Serrano Álvarez	US / MSU
Mattia Russel Pantalone	KI
Miklós Geiszt	SU
Ming - Fong Lin	UNMC
Mohanraj Mahendrarvarman	NIO Selenoprotein
Nikolett Juhász	UD CCI
Njomza Gashi	UD
Oleh Khalimonchuk	UNL
Péter Bay	UD
Péter Nagy	NIO MITO UD CCI UVMB HUN-REN
Qing Cheng	KI
Rachelle Nelson	UNL
Samantha DeGrave - Madderom	UNL
Tamás Gáll	UD
Thomas Dempster	MUSC
Viola Varga	SU
Xueping Jiang	KI
Yuchao Ding	UD
Zoe Seaford	MSU
Zsolt Radák	TF (HUSS)
Zsuzsanna Pató	NIO Selenoprotein

Practical information

Transportation to the University:

- From Debrecen Airport: Taxi (Főnix Taxi or City Taxi Debrecen)
- From Budapest Airport:
 - Airport shuttle services (<https://www.civistranszfer.hu/en/services>)
 - Train: MÁV (Hungarian Railways) Intercity Trains run from Budapest Nyugati Station to Debrecen Nagytáv, or the trains stop at Ferihegy station or Kőbánya-Kispest station, both are accessible from BUD Terminal 2 by bus line 200E.
- From Debrecen Train Station (Nagytáv):
 - Tram Line 1, direction Egyetem, Egyetem stop
 - Timetables: <https://www.menetrend-debrecen.hu/>
 - Please mind that the 9th Monday is a holiday, public transport is somewhat scarce that day

Local public transport company: DKV

single ticket: 480 HUF in the DKV application, 500 HUF on paper

7 days ticket: 4500 HUF.

https://www.dkv.hu/jegyek_berletek_potdij

(Switch to English in the upper right corner)

App: <https://www.dkv-mobility.com/en/en/digital-solutions/customer-portal/dkv-mobility-app/>

To the venue:

All accommodations are in walking distance to the Learning Center, the main site of the course.

Other information:

Measurements: Metric system is used in Hungary

Time zone: CEST (Central European Summer Time), which is GMT + 1hour.

Electric network in Hungary operates on a 230V supply voltage and 50Hz, the plugs have 2 round pins. Guests from the US will need travel adaptors of types F or C.

<https://www.electricalsafetyfirst.org.uk/guidance/advice-for-you/when-travelling/travel-adaptor-for-hungary/>

Weather: Summer (26-32 °C), occasional rain may occur

Currency: Hungarian Forint (HUF), exchange rates (06.04):

1 USD = 354 HUF ; 1 EUR = 404 HUF

Cash/Card usage: Debit cards are widely accepted in restaurants and shops, although it is practical to have some cash

Leisure time

Welcome to Debrecen – presentation

https://www.canva.com/design/DAGm3Um5SyM/VClpi-mbalvuB-ZEAU40Q/view?utm_content=DAGm3Um5SyM&utm_campaign=designshare&utm_medium=link&utm_source=viewer

Debrecziner Gourmet Festival: 13-15 June 2025

<https://www.debreczinergourmet.hu/en>

Free time activities

- Great Forest (Nagyerdő)
- Great Reformed Church (Nagytemplom) – Kossuth street



- Agora Science Center and Botanical Garden
- Aquaticum Debrecen – Mediterranean Water Park
- Déry Múzeum
- Nagyerdei Stadium



Hal köz - Downtown



Csokonai Theater

Prof. Péter Nagy, PhD	peter.nagy@unideb.hu		Main organizer
Éva Dóka, PhD	doka.eva@oncol.hu	+36 30 630 38 82	scientific questions, scheduling, presentations etc.
Anett Jávör	javor.anett@unideb.hu		local organizational issues, venues, technical assistance etc.
Nikolett Juhász	nikolett.juhasz@unideb.hu	+36 30 870 55 40	local organizational issues, venues, technical assistance etc.