Faculty of Medicine in Rijeka

**Curriculum**
**2025/2026**

For course

# Oxidative Stress and Antioxidants

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|---|---|
| Study program: | **Medical Studies in English (R)** (elective)<br>University integrated undergraduate and graduate study |
| Department: | **Department of Medical Chemistry, Biochemistry and Clinical Chemistry** |
| Course coordinator: | **prof. dr. sc. Domitrović Robert, univ. mag. med. biochem.** |
| Year of study: | **2** |
| ECTS: | **1.5** |
| Incentive ECTS: | **0 (0.00%)** |
| Foreign language: | **Possibility of teaching in a foreign language** |

## Course information:

Free radicals as extremely reactive chemical species represent a potential danger to all cells and contribute to the development of cardiovascular, neurodegenerative and inflammatory diseases, tumors, diabetes and other pathological conditions. However, at the same time, free radicals and other reactive oxygen and nitrogen species (ROS, "reactive oxygen species", RNS, "reactive nitrogen species"), by participating in phagocytosis and oxygenation, have a significant positive effect on metabolism. Within the framework of the course, the modes of action and effects of free radicals and ROS and RNS molecules in oxidative stress and the pathogenesis of various diseases will be discussed. In addition, students will be able to explain how the organism is protected from their harmful effects.

## List of assigned reading:

1. Selected scientific papers.

## List of optional reading:

1. Internet databases.

## Curriculum:

### Lectures list (with titles and explanation):

**P1 What is oxidative stress?**

Objasniti što je oksidacijski stres. Opisati slobodne radikale, reaktivne spojeve kisika i dušika, prooksidanse i antioksidanse. Istaknuti važnost pravilne prehrane. Protumačiti stvaranje reaktivnih spojeva kisika i dušika. Navesti način i mjesta stvaranja slobodnih radikala i drugih reaktivnih spojeva u metabolizmu.

**P2 Significance of oxidative stress**

Protumačiti fiziološku funkciju reaktivnih spojeva kisika i dušika. Objasniti ulogu slobodnih radikala i drugih reaktivnih spojeva u metabolizmu.

**P3 Markers of oxidative stress**

Navesti koji su biljezi oksidacijskog oštećenja DNA. Objasniti produkte nastale u reakciji slobodnih radikala s DNA i metode njihovog određivanja. Navesti koji su biljezi oksidacijskog oštećenja proteina. Objasniti produkte nastale u reakciji slobodnih radikala s proteinima i metode njihovog određivanja. Navesti koji su biljezi oksidacijskog oštećenja lipida.  Objasniti produkte nastale u reakciji slobodnih radikala s lipidima i metode njihovog određivanja.

**P4 Antioxidant types**

Navesti enzimske antioksidanse. Objasniti ulogu superoksid dismutaze, glutation peroksidaze i katalaze u redukciji oksidacijskog oštećenja stanice. Navesti neenzimske antioksidanse. Objasniti ulogu vitamina C, vitamina E, karotenoida, glutationa, melatonina, liponskae kiseline, flavonoida i dr. spojeva s antioksidacijskim učinkom u sprječavanju oksidacijskog oštećenja stanice.

**P5 Oxidative stress and disease**

Povezati reaktivnr spojevr kisika i dušika, starenje i patološka stanja. Protumačiti ulogu slobodnih radikala i drugih reaktivnih spojeva u procesu starenja, razvoju dijabetesa, kardiovaskularnih bolesti, tumora i drugih kroničnih bolesti.

### Seminars list (with titles and explanation):

**S1 Presentations of seminar papers 1**

Independent presentation of the seminar unit covered.

**S2 Presentations of seminar papers 2**

Independent presentation of the seminar unit covered.

**S3 Presentations of seminar papers 3**

Independent presentation of the seminar unit covered.

**S4 Presentations of seminar papers 4**

## Student obligations:

Attendance and active participation of students in classes. The student must, in agreement with the course leader, prepare a seminar paper and make a PowerPoint presentation from a specific area related to oxidative stress. Students present their PowerPoint presentations in front of the leader and other colleagues. Every student is obliged to submit his seminar paper and PowerPoint presentation in electronic form.

## Exam (exam taking, description of the written/oral/practical part of the exam, point distribution, grading criteria):

Student evaluation is carried out according to the valid Rulebook on studies of the University of Rijeka and according to the Rulebook on student evaluation at the Faculty of Medicine in Rijeka.

## Other notes (related to the course) important for students:

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## COURSE HOURS 2025/2026

Oxidative Stress and Antioxidants

| **Lectures**<br>(Place and time or group) | **Seminars**<br>(Place and time or group) |
|---|---|
| **17.03.2026** | |
| P1 What is oxidative stress?:<br>• ONLINE (17:00 - 17:45) [152]<br>  ○ OS-A<br><br>P2 Significance of oxidative stress:<br>• ONLINE (17:45 - 18:30) [152]<br>  ○ OS-A<br><br>P3 Markers of oxidative stress:<br>• ONLINE (18:30 - 19:15) [152]<br>  ○ OS-A<br><br>P4 Antioxidant types:<br>• ONLINE (19:15 - 20:00) [152]<br>  ○ OS-A<br><br>P5 Oxidative stress and disease:<br>• ONLINE (20:00 - 20:45) [152]<br>  ○ OS-A | |
| prof. dr. sc. Domitrović Robert, univ. mag. med. biochem. [152] | |
| **30.03.2026** | |
| | S1 Presentations of seminar papers 1:<br>• ONLINE (18:00 - 21:45) [152]<br>  ○ OS-A |
| prof. dr. sc. Domitrović Robert, univ. mag. med. biochem. [152] | |
| **13.04.2026** | |
| | S2 Presentations of seminar papers 2:<br>• ONLINE (17:00 - 20:45) [152]<br>  ○ OS-A |
| prof. dr. sc. Domitrović Robert, univ. mag. med. biochem. [152] | |
| **24.04.2026** | |
| | S3 Presentations of seminar papers 3:<br>• ONLINE (14:00 - 17:45) [152]<br>  ○ OS-A |
| prof. dr. sc. Domitrović Robert, univ. mag. med. biochem. [152] | |
| **12.05.2026** | |
| | S4 Presentations of seminar papers 4:<br>• ONLINE (16:00 - 19:45) [152]<br>  ○ OS-A |
| prof. dr. sc. Domitrović Robert, univ. mag. med. biochem. [152] | |

## List of lectures, seminars and practicals:

| LECTURES (TOPIC) | Number of hours | Location |
|---|---|---|

| | | |
|---|---|---|
| P1 What is oxidative stress? | 1 | ONLINE |
| P2 Significance of oxidative stress | 1 | ONLINE |
| P3 Markers of oxidative stress | 1 | ONLINE |
| P4 Antioxidant types | 1 | ONLINE |
| P5 Oxidative stress and disease | 1 | ONLINE |

| SEMINARS (TOPIC) | Number of hours | Location |
|---|---|---|
| S1 Presentations of seminar papers 1 | 5 | ONLINE |
| S2 Presentations of seminar papers 2 | 5 | ONLINE |
| S3 Presentations of seminar papers 3 | 5 | ONLINE |
| S4 Presentations of seminar papers 4 | 5 | ONLINE |

**EXAM DATES (final exam):**