



**Karolinska  
Institutet**

Course syllabus for

## **Oral Biomedicine 1, 11.5 credits**

Oral biomedicin 1, 11.5 hp

This course syllabus is valid from autumn 2022.

Please note that the course syllabus is available in the following versions:

[Autumn2019](#) , [Autumn2020](#) , Autumn2022 , [Autumn2023](#) , [Autumn2024](#)

Course code	2TL051
Course name	Oral Biomedicine 1
Credits	11.5 credits
Form of Education	Higher Education, study regulation 2007
Main field of study	Odontology
Level	G1 - First cycle 1
Grading scale	Pass, Fail
Department	Department of Laboratory Medicine
Participating institutions	<ul style="list-style-type: none"><li>• Department of Dental Medicine</li></ul>
Decided by	Utbildningsnämnden DENTMED
Decision date	2019-04-15
Revised by	Education committee DENTMED
Last revision	2022-03-24
Course syllabus valid from	Autumn 2022

## **Specific entry requirements**

Biology 2, Physics 2, Chemistry 2, Mathematics 4 or Mathematics D.

## **Objectives**

### **Cell and Molecular Biology, 4 hp**

After the course, the student can:

- Explain terms and definitions within cell and molecular biology to such an extent that these can be related to and applied in the future dental studies.
- Describe the reactions and processes in the organelles of the cell and how these are interconnected.
- Explain the dynamics in the flow of genetic information and the consequences of disturbances to this flow.
- Reflect and identify common laboratory techniques in cell and molecular biology to understand

cell functionality, gene expression and their potential diagnostic capabilities.

- Reflect on and discuss the importance of cell and molecular biology in dental and medical research.

### **General and Medical Chemistry, 6 hp**

After the course, the student can:

- Explain terms and principles for basic chemistry to such an extent that these can be related to and applied in future dentistry studies.
- Explain and apply acid-base equilibria and buffer systems, and put these in a physiological and dental perspective.
- Describe the structure of different biomolecules and reason about the relationship between structure and function.
- At a basic level, account for the body's normal metabolism.
- Briefly describe the functions of the blood.
- Reflect on and discuss the importance of medical chemistry in dental and medical research.

### **Embryology, 1,5 hp**

After the course, the student can in English:

- Briefly describe and explain the development of the embryo and fetus with a focus on the head and neck.
- Explain disorders of normal embryogenesis.
- Relate embryonic and fetal development to future dental studies.

## **Content**

The course consists of three modules:

### **Cell and Molecular Biology, 4.0 hp**

Grading scale: GU

The module covers:

- Eukaryotic and prokaryotic cell organization and organelles.
- The flow of genetic information from DNA organization and replication.
- Gene expression, transcription and translation.
- Intracellular protein sorting and transportation to reach their destination in or out of the cell, including vesicle transportation.
- Cell cycle and its regulation and control of cell division, and cell death.
- Eukaryotic cell adhesion, cell junctions and communication with its environment, other cells and extracellular matrix.
- Cell signaling via signal molecules and receptors, and signaling pathways.
- Basic cell and molecular biology methods, including microscopy and molecular methods from DNA and RNA to protein detection.

### **General and Medical Chemistry, 6.0 hp**

Grading scale: GU

The module covers:

- The terms and principles of basic chemistry. This includes theory on the structure and properties of molecules and the different types of chemical binding.
- Chemical reactions, chemical equilibrium and equilibrium shift.

- Functional groups and their importance for the properties of molecules.
- Equilibrium relationships between acids and bases with emphasis on the properties and limitations of physiological buffers. Particular emphasis is placed on acid-base properties and buffer systems in the oral cavity.
- The relationship between structure and function with emphasis on the structure and properties of proteins, lipids and carbohydrates.
- The role of proteins as transporters and enzymes, with examples of particular relevance for the dental field.
- Basal metabolism of carbohydrates, lipids and amino acids. Regulation of metabolic pathways and how various processes within metabolism are linked together for a holistic view of the cell's energy metabolism.
- The blood's functions with an emphasis on the coagulation process.
- The importance of medical chemistry in dental and medical research.

## Embryology, 1.5 hp

Grading scale: GU

The module covers:

- The formation of the germ layers and neural tube.
- Embryonic and fetal development including abnormalities in the normal course of action relevant to future dentists.

## Teaching methods

Lectures, digital lectures with flipped classroom sessions, seminars, quizzes, and laboratory sessions.

## Examination

### Cell and Molecular Biology, 4 hp

Examination: Written examinations.

Compulsory parts: Seminars.

### General and Medical Chemistry, 6 hp

Examination: Written examinations.

Compulsory parts: Laboratory sessions and seminars, as well as preparatory assignments before laboratory sessions.

### Embryology, 1.5 hp

Examination: Written and oral examination.

The examiner decides whether, and if so how, absence from compulsory course elements can be made up. Study results cannot be reported until the student has participated in compulsory course elements or compensated for any absence in accordance with instructions from the examiner. Absence from a compulsory course element could mean that the student cannot retake the element until the next time the course is offered.

Students who do not pass a regular examination are entitled to re-sit the examination on five more occasions. If the student has failed six examinations/tests, no additional examination is given. Each occasion the student participates in the same test counts as an examination. Submission of a blank exam paper is regarded as an examination. In case a student is registered for an examination but does not attend, this is not regarded as an examination.

If there are special grounds, or a need for adaptation for a student with a disability, the examiner may decide to deviate from the syllabus's regulations on the examination form, the number of examination

opportunities, the possibility of supplementation or exemptions from the compulsory section/s of the course etc. Content and learning outcomes as well as the level of expected skills, knowledge and abilities may not be changed, removed or reduced.

## Transitional provisions

If the course is discontinued or undergoes major changes, the examination according to the previous literature list and learning outcomes is offered no more than one academic year after the audit /closure.

## Other directives

Language of instruction: English.

Language of examination: all questions are in English. Answers in English or Swedish are acceptable for modules Cell and Molecular Biology and General and Medical Chemistry. Only English is acceptable for examinations in Embryology.

## Literature and other teaching aids

### *Mandatory Literature*

*Alberts, Bruce*

#### **Essential cell biology**

Fifth edition. : W.W. Norton and Company, 2019 - 734 pages

ISBN:9780393680393 LIBRIS-ID:5gf2g9ln3s6t33vl

[Library search](#)

#### **Fundamentals of general, organic, and biological chemistry**

*McMurry, John; Ballantine, David S.; Hoeger, Carl A.; Peterson, Virginia E.; Madsen, Sara; Meert, Christel; Pearson, Andrew*

eighth edition : Pearson, 2017 - 971 sidor

ISBN:9780134015187 LIBRIS-ID:jszqwtjhgdhb6np1

*There is also a paperback version of the same book with ISBN 9781292123462*

[Library search](#)

*Mitchell, Barry; Sharma, R.*

#### **Embryology : an illustrated colour text**

2. ed.. : Edinburgh : Churchill Livingstone, cop. 2009. - vii, 85 s.

ISBN:978-0-7020-3225-7 LIBRIS-ID:11587160

[Library search](#)

### *Recommended Literature*

#### **Basic Sciences for Dental Students**

*Whawell, Simon A.; Lambert, Daniel W.*

Hoboken, NJ : John Wiley & Sons, 2017 - 274 sidor

ISBN:9781118905579 LIBRIS-ID:20896970

[Library search](#)