

# Technology in Intensive Care and Surgery

Programme course

6 credits

Teknik för intensivvård och kirurgi

TBMT26

Valid from: 2017 Spring semester

**Determined by**

Board of Studies for Electrical  
Engineering, Physics and Mathematics

**Date determined**

2017-01-25

**Replaced by**

TBMT24

## Main field of study

Biomedical Engineering

## Course level

Second cycle

## Advancement level

A1N

## Course offered for

- Computer Science and Engineering, M Sc in Engineering
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- Applied Physics and Electrical Engineering, M Sc in Engineering
- Biomedical Engineering, Master's programme
- Information Technology, M Sc in Engineering
- Applied Physics and Electrical Engineering - International, M Sc in Engineering

## Entry requirements

Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

## Prerequisites

Anatomy and Physiology, Introduction to Biomedical Engineering

## Intended learning outcomes

The student should have knowledge of technologies and systems for intensive care and therapy in highly specialized care. The course also enlightens problems related to monitoring of vital functions and their usefulness from medical and ethical perspectives. The following goals should be fulfilled:

- Exemplify and demonstrate engineering skills regarding monitoring systems and their clinical applications in intensive care, anaesthesia and ventilation.
- Be able to assess differences between technologies used and the physiological parameters measured during intensive care monitoring for adults, infants and fetus.
- Define technical principles and applications of heart pumps.
- Summarize the operating theatres design, equipment and organization.
- Have knowledge regarding physical principles of tissue destructive methods in surgery.
- Have knowledge of instruments and applications for endoscopic surgery.
- Summarize applications in laparoscopic surgery, cardiothoracic surgery and neurosurgery
- Be able to reflect on ethical aspects regarding intensive care and therapeutic systems based on ethical principles and Swedish law.
- Exemplify risks and regulations for medical devices or medical technical products and summarize how to report incidents.

## Course content

- Intensive care: Technical systems and clinical applications regarding intensive care, anaesthesia, ventilation, monitoring of vital parameters. Examples of application: fetus and neonatal monitoring, intensive care stations, cardiac/heart pumps.
- Therapeutic systems: Technical systems for minimally invasive surgery and their physiological background e.g. the operating theatre design and equipment, systems for navigation, simulation and surgical planning, endoscopic surgery, electro- and laser surgery. Applications from e.g. thoracic,- and neurosurgery.
- Ethics and incidents: Ethical questions regarding intensive care, therapeutic systems, transplantation and incidents.
- Example of project work: Endoscopic surgery, Heart assistive pumps, Anesthesia, Fetus- and labour monitoring, Neonatal care, Intensive care, Neuronavigation.
- Laboratory work: The Ventilator, Electrosurgery.

## Teaching and working methods

Lectures, demonstrations, symposia, project studies, laboratory work

## Examination

|      |                     |           |            |
|------|---------------------|-----------|------------|
| UPG1 | Project assignment  | 2 credits | U, G       |
| LAB1 | Laboratory work     | 1 credits | U, G       |
| TEN1 | Written examination | 3 credits | U, 3, 4, 5 |

## Grades

Four-grade scale, LiU, U, 3, 4, 5

## Department

Institutionen för medicinsk teknik

## Director of Studies or equivalent

Marcus Larsson

## Examiner

Karin Wårdell

## Education components

Preliminary scheduled hours: 52 h

Recommended self-study hours: 108 h

## Course literature

### Additional literature

#### Other

Medicin och Teknik (Kap.10-12), 2006, Lindén och Öberg;

Teknik i praktisk sjukvård, 2003, Jacobsson och Öberg;

Minimally Invasive Instrumentation (Kap.10-13, 15), 2001, Webster;

Utvalda kapitel från "Encyclopedia of Medical Devices and Instrumentation",

Webster, 2006;

Utvalda kapitel från "The Biomedical Engineering Handbook", Bronzino, 2000;

LabPM Elektrosurgery, 2009; LabPM The Ventilator, 2009;

Additional material from lectures.

## Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at [http://stydokument.liu.se/Regelsamling/Innehall/Utbildning\\_pa\\_grund-\\_och\\_avancerad\\_niva](http://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva).