## Notes on the module handbook of the department Mechanical and Process Engineering

Die hier dargestellten veröffentlichten Studiengang-, Modul- und Kursdaten des Fachbereichs Maschinenbau und Verfahrenstechnik ersetzen die Modulbeschreibungen im KIS und wuden mit Ausnahme folgender Studiengänge am 28.10.2020 verabschiedet.

Ausnahmen:

- BSc. Bio- und Chemieingenieurwissenschaften (Stand WS 20/21): https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MH_BSc_BCI.pdf (https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MH_BSc_BCI.pdf)
- BEd. Lehramt Metalltechnik (Stand WS 19/20): https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MHB_Bachelor_Lehramt_Metalltechnik.pdf (https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MHB_Bachelor_Lehramt_Metalltechnik.pdf)
- MSc. Bio- und Chemieingenieurwissenschaften (Stand WS 20/21): https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MH_Msc_BCI.pdf (https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MH_Msc_BCI.pdf)
- MEd. Lehramt Metalltechnik Werkstoffe und Fertigung (Stand WS 19/20): https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MHB_Master_Lehramt_Metalltechnik_-_Werkstoffe_und_Fertigung.pdf (https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MHB_Master_Lehramt_Metalltechnik_-_Werkstoffe_und_Fertigung.pdf)
- MEd. Lehramt Metalltechnik Maschinen- und Fahrzeugtechnik (Stand WS 19/20): https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MHB_Master_Lehramt_Metalltechnik_-_Fahrzeugtechnik.pdf (https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MHB_Master_Lehramt_Metalltechnik_-_Fahrzeugtechnik.pdf)
- MEd. Lehramt Metalltechnik Verfahrenstechnik (Stand WS 19/20): https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MHB_Master_Lehramt_Metalltechnik_-_Verfahrenstechnik.pdf (https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MHB_Master_Lehramt_Metalltechnik_-_Verfahrenstechnik.pdf)

# Module MV-BioVT-M118-M-4

## Bioanalytics and Bioprocess Analytics I/II (M, 3.0 LP)

### Module Identification

| Module Number | Module Name | CP (Effort) |
|---|---|---|
| **MV-BioVT-M118-M-4** | *Bioanalytics and Bioprocess Analytics I/II* | 3.0 CP (90 h) |

### Basedata

| | |
|---|---|
| **CP, Effort** | 3.0 CP = 90 h |
| **Position of the semester** | 2 Sem. from WiSe |
| **Level** | [4] Bachelor (Specialization) |
| **Language** | [DE] German |
| **Module Manager** | Ulber, Roland, Prof. Dr. (PROF \| DEPT: MV) (/staff/297/) |
| **Lecturers** | Ulber, Roland, Prof. Dr. (PROF \| DEPT: MV) (/staff/297/) |
| **Area of study** | [MV-BioVT] Bioprocess Engineering |
| **Reference course of study** | [MV-88.805-SG] M.Sc. Biological Process Engineering (/mhb/FB-MV/cos-558/) |
| **Livecycle-State** | [NORM] Active |

## Courses

| Type/SWS | Course Number | Choice in Module-Part | SL | PL | CP | Sem. |
|---|---|---|---|---|---|---|
| 1V | **MV-BioVT-86435-K-4** (/mhb/courses/MV-BioVT-86435-K-4/) | P | - | PL1 | 1.5 | WiSe |
| 1V | **MV-BioVT-86436-K-4** (/mhb/courses/MV-BioVT-86436-K-4/) | P | - | PL1 | 1.5 | SuSe |

- About **[MV-BioVT-86435-K-4]**: Title: "Bioanalytics and Bioprocess Analytics I"; Presence-Time: 14 h; Self-Study: 31 h
- About **[MV-BioVT-86436-K-4]**: Title: "Bioanalytics and Bioprocess Analytics II"; Presence-Time: 14 h; Self-Study: 31 h

## Examination achievement PL1

- Form of examination: **written or oral examination**
- Examination Frequency: each semester
- Examination number: 10118 ("Bioanalytics I, II")

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|---|
| Oral examination (30 minutes) or written examination (120 minutes) |

## Evaluation of grades

The grade of the module examination is also the module grade.

## Contents

**From [MV-BioVT-86435-K-4] Bioanalytics and Bioprocess Analytics I** (/mhb/courses/MV-BioVT-86435-K-4/)**:**

In the lecture the following sensor systems are discussed, which are of central importance for the operation of a bioreactor:

- pH sensor technology (combination electrode, semiconductor sensors)
- Dissolved gas sensors (oxygen and carbon dioxide)
- Exhaust gas analysis (oxygen and carbon dioxide)
- Sensors for measuring temperature and power input
- Pressure and foam sensors

The analytical systems important for the determination of substrates and products

- biosensors,

- ELISA,
- immunoanalytics,
- HPLC and
- FPLC

will be discussed in a further thematic block. The coupling of analytical systems to the bioprocess via e.g. SIA and FIA systems will be discussed in the third lecture block. In addition, the principles of the detectors used (e.g. UV, fluorescence, RI) are presented for the respective systems.

**From [MV-BioVT-86436-K-4] Bioanalytics and Bioprocess Analytics II** (/mhb/courses/MV-BioVT-86436-K-4/)**:**

Students learn the methodology of how individual components (especially proteins) can be determined as selectively as possible in a complex mixture of substances (fermentation medium) and learn to independently develop appropriate analytical strategies. Main topics are:

- Analytical methods of modern bioprocess development and technology
- Mass Spectrometry
- Electrophoresis
- Staining methods
- Chip Technologies
- 2D fluorescence spectroscopy

## Competencies / intended learning achievements

The students are able to

- explain basic terms of bioanalytics
- assign physical and chemical process variables to the necessary analysis technology
- explain In-Situ and Ex-Situ sensors
- use HPLC methods
- compare different analysis methods for various parameters and independently make a process-relevant selection
- develop analysis strategies independently
- reproduce the functional principles of amperometric and potentiometric sensors and to calculate their sensor signals
- design a biosensor independently for a bioanalytical problem

## Literature

- F. Lottspeich, J.W. Engels; Bioanalytik; Elsevier ISBN-10: 3-8274-1520-9
- H. Chmiel; Bioprozesstechnik; Elsevier ISBN 3-8247-1607-8
- W. Storhas; Bioverfahrensentwicklung, Wiley-VCH ISBN 3-527-28866-X
- current literature on chip technology

## Requirements for attendance (informal)

Knowledge of fermentations and basic chemical and microbiological knowledge

### Modules:

- [MV-BioVT-60-M-4] Fundamentals in bioprocess engineering (M, 3.0 LP) (/mhb/modules/MV-BioVT-60-M-4/)

## Requirements for attendance (formal)

None

## References to Module / Module Number [MV-BioVT-M118-M-4]

| Course of Study | Section | Choice/Obligation |
| --- | --- | --- |
| [MV-88.A29-SG] M.Sc. Biological and Chemical Engineering (/mhb/FB-MV/cos-567/) | Studienschwerpunkt I | [WP] Compulsory Elective |

| Module-Pool | Name |
| --- | --- |
| [MV-ALL-MPOOL-6 (/mhb/modulepools/MV-ALL-MPOOL-6/)] | Wahlpflichtmodule allgemein |
| [MV-BioVT-MPOOL-6 (/mhb/modulepools/MV-BioVT-MPOOL-6/)] | Wahlpflichtmodule Bioverfahrenstechnik |