The guidelines admission process.

Start winter term 2020/21

MCI - The Entrepreneurial School®
Master program Biotechnology

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Introduction.

Thank you for your interest in our full-time Master program Biotechnology.

Completing our online application allows you to participate in our admission process. Places are allocated based on the following criteria:

Curriculum vitae 30%
Your personal and professional qualifications as well as your experience will be assessed on the basis of the documents submitted with your application.

Entrance exam 20%
An online exam will be held to assess candidates’ knowledge of engineering and natural science and their competence in English.

Interview 50%
A personal interview gives candidates an opportunity to make a personal presentation, to discuss the information provided in their application papers, and to explain their educational and professional goals.

We are looking forward to receiving your application.

Best regards,

[Signature]

Prof. Dr. Christoph Griesbeck

Head of Department & Studies
2 schedule for the admissions procedure.

To provide greater flexibility in meeting your needs, MCI has introduced an admissions process with sessions held on separate dates. Since we cannot predict how many applicants will present themselves for the various sessions, you are recommended to participate at the earliest possible date so as to secure a place as soon as possible.

Please register yourself for the online admissions procedure in time.

For any further information please contact Ms. Anna Baumgartner:

Mail: anna-lena.schöpf@mci.edu
Tel.: 0043 (0)512 2070 3805

Please note the application deadline for each session (https://www.mci.edu/en/study/master/biotechnology)

<table>
<thead>
<tr>
<th>Dates</th>
<th>Application deadline</th>
<th>Entrance Exam &amp; Interview</th>
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<tbody>
<tr>
<td>Date 1*</td>
<td>17, Nov 2019</td>
<td>02, Dec 2019</td>
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<td>Date 2</td>
<td>02, Feb 2020</td>
<td>17, Feb 2020</td>
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<td>Date 3</td>
<td>29, Mar 2020</td>
<td>14, Apr 2020</td>
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<td>Date 4</td>
<td>31, Jun 2020</td>
<td>15, Jun 2020</td>
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*recommended for applications from non-EU countries
3 **Curriculum Vitae.**

A key element in the admissions process is an assessment of the candidate’s CV on the basis of the submitted documents. Additional qualifications beyond the basic prerequisites such as academic performance, further education, work experience and periods spent abroad will be considered.

Applications can be submitted at any time, an early application is recommended.

4 **Entrance Exam.**

The written entrance exam is an online test with multiple or single choice questions. It serves to assess the candidates’ competence in engineering as well as their command of English.

It consists of the following parts:

- Chemical process engineering (20 minutes)
- Thermal process engineering (20 minutes)
- Biological Process Engineering (20 minutes)
- Microbiology, Molecular and Cell Biology (20 minutes)
- English test (60 minutes)

5 **Personal Interview.**

The personal interview is held in a panel of three. It gives candidates the opportunity to present their goals, motives and competences, and permits an evaluation of their suitability for the study program.

We look forward to receiving your application!
6 sample questionnaires.

6.1 CHEMICAL PROCESS ENGINEERING (CVT)

Recommended reading

Hessel: Chemical Micro Process Engineering. J. Wiley 2004

Recommended reading of the following chapters/topics

Characterization of chemical reactors
Conversion, yield and selectivity
Microkinetics of homogeneous reactions
Characterization of residence time distribution
Analysis of kinetics
Heterogeneous catalysis

Sample questionnaires

1. What is the effect of a catalyst?
   a) shift of reaction equilibrium
   b) reduction of activation energy
   c) shift of product concentration
   d) rise in temperature

2. Which statement does the Arrhenius equation describe?
   a) the reaction rate is temperature-dependent
   b) the reaction rate is not temperature-dependent
   c) the reaction rate is time-dependent
   d) the reaction rate is not time-dependent
6.2 THERMAL PROCESS ENGINEERING (TVT)

Recommended reading

Mersmann: Thermal Separation Technology. Springer 2011

Recommended reading of the following chapters/topics

Phase equilibria / Evaporation
Distillation
Rectification
Absorption
Adsorption
Extraction
Drying

Sample questionnaires

1. What does the term hygroscopic mean?
   a) binding of moisture
   b) rejecting of moisture
   c) reproduction of water molecules
   d) detection of water molecules

2. What is the reverse process of absorption?
   a) adsorption
   b) desorption
   c) vaporization
   d) filtration
6.3 BIOLOGICAL PROCESS ENGINEERING

Recommended reading

Katoh et al.: Biochemical Engineering. Wiley-VCH  
Johnson: Biological Process Engineering. Eiley-Interscience

Recommended reading of the following chapters/topics

Batch, fed batch and continuous fermentation processes  
Concepts, types and properties of bioreactors  
Kinetics of bioprocesses  
Material and energy balance  
Cell growth

Sample questionnaires

1. What does the kinetics of Gaden describe?
   a) Generation of product  
   b) Formation of biomass  
   c) Encymatic reaction

2. You are starting an experiment with a cell density of \(10^4\) cells per ml, at the end of the experiment \(1.3 \times 10^6\) cells per ml are measured. How many generations have passed?
   a) 7  
   b) 1  
   c) 65  
   d) 42

3. What do submers-reactors represent?
   a) cultivation of microorganisms in solvent  
   b) Fixed-bed reactor  
   c) Fluidized bed reactors  
   d) Cultivation of immobilized microorganisms
6.4 MICROBIOLOGY, MOLECULAR AND CELL BIOLOGY

Recommended reading
- Urry et al.: Campbell Biology. Pearson
- Clark: Molecular Biology. Elsevier
- Madigan et al.: Brock Biology of Microorganisms. Addison-Wesley Longman
- Berg et al.: Stryer Biochemistry. WH Freeman

Recommended reading of the following chapters/topics
- General properties and differences of prokaryotic and eukaryotic cells
- Molecular cloning techniques
- Principles of metabolism
- Gene expression
- Proteins and enzymes

Sample questionnaires
1. Where does glycolysis take place in a eukaryotic cell?
   a) Mitochondrial matrix
   b) Outer mitochondrial membrane
   c) Inner mitochondrial membrane
   d) Mitochondrial intermembrane space
   e) Cytosol

2. Photoautotrophic organisms use
   a) Nitrogen as an energy source and carbon dioxide as a carbon source
   b) Hydrogen sulfide as an energy source and carbon dioxide as a carbon source
   c) Light as an energy source and carbon dioxide as a carbon source
   d) Carbon dioxide as an energy source and as a carbon source
   e) Light as an energy source and methane as a carbon source

3. What is not a part of a PCR reaction?
   a) DNA-Polymerase
   b) DNA-Ligase
c) Nucleotides
d) Primers
e) Template-DNA

6.5 SOLUTIONS

CVT:  1b, 2a
TVT:  1c, 2 a b c d
BVT:  1a, 2a, 3d
BIO:  1e, 2c, 3b