Module Name  
Advanced Inorganic Chemistry

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Level (type)</th>
<th>CP</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-442</td>
<td>Year 2 (CORE)</td>
<td>5</td>
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</tbody>
</table>

Module Components

<table>
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<tbody>
<tr>
<td>CO-442-A</td>
<td>Advanced Inorganic Chemistry</td>
<td>Lecture</td>
<td>5</td>
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</tbody>
</table>

Module Coordinator

Ulrich Kortz

Program Affiliation

- Chemistry

Mandatory Status

Mandatory for Chemistry

Entry Requirements

Pre-requisites

- General and Inorganic Chemistry

Co-requisites

- Knowledge, Abilities, or Skills

- None

Frequency

Annually

Forms of Learning and Teaching

- Lecture (35 hours)
- Tutorial (10 hours)
- Private Study Lecture (80 hours)

Duration

1 semester

Workload

125 hours

Recommendations for Preparation

Early reading, extensive note taking and self-testing, work through practice problems, fully understand the material before entering laboratory and the risks associated with the daily goals.

Content and Educational Aims

This Module introduces advanced concepts of inorganic chemistry, such as Molecular Structure and Bonding (VB theory, MO theory, semiconductors), Symmetry and Group Theory, Structures of Solids (metals, ionic solids), d-metal Complexes (structure and symmetry, bonding and electronic structure, reactions of complexes), The Electronic Spectra of Complexes (electronic spectra of atoms vs complexes, bonding and spectra of M-M bonded compounds).

Intended Learning Outcomes

By the end of the module, the student will be able to:

- discuss advanced concepts of inorganic and organometallic chemistry;
- master various topics such as synthesis of inorganic compounds, bonding, structure, etc;
- explain what are coordination compounds, their nomenclature and isomerism;
- determine the electronic structure of d-metal complexes and explain their properties (correlate between electronic structure and properties);
- explain the elements in the periodic table and the periodic properties of these elements.
- predict the geometries of inorganic compounds;
- determine the structure and symmetry of molecules and correlate between symmetry and properties;
7.11 Bioprocess Engineering

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<tbody>
<tr>
<td>Bioprocess Engineering</td>
<td>CO-444</td>
<td>Year 2 (CORE)</td>
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### Module Components

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<tbody>
<tr>
<td>CO-444-A</td>
<td>Bioprocess Engineering</td>
<td>Lecture and tutorial</td>
<td>5</td>
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#### Module Coordinator

Marcelo Fernandez Lahore

#### Program Affiliation

- Chemistry

#### Mandatory Status

Mandatory for Chemistry

### Entry Requirements

<table>
<thead>
<tr>
<th>Pre-requisites</th>
<th>Co-requisites</th>
<th>Knowledge, Abilities, or Skills</th>
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<tbody>
<tr>
<td>☑ Introduction to Biotechnology</td>
<td>☐ None</td>
<td></td>
</tr>
<tr>
<td>☑ Industrial Biotechnology</td>
<td></td>
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</tbody>
</table>

#### Frequency

Annually

### Forms of Learning and Teaching

- Lecture and tutorial (45 hours)
- Private study (45 hours)
- Exam preparation (35 hours)

#### Duration

1 semester

#### Workload

125 hours

### Recommendations for Preparation

None

### Content and Educational Aims

Biotechnology advances in the laboratory require appropriate strategies for implementation in industrial practice. One main pre-requisite for exploitation is the ability to efficiently scale-up any processes involved for final product delivery to the market. Process biotechnology is concerned with the design, dovetailing, performance evaluation and final implementation of unit operations. Examples are fermentation, solid-liquid separation, extraction and leaching, adsorption and chromatography. Every production scheme has to be validated in terms of product quality and processing costs. Software packages may be employed to illustrate processing alternatives.
### Module Name
Sustainable Value Creation with Biotechnology. From Science to Business.

### Module Code
JTBQ-BQ-011

### Level (type)
Year 3 (Jacobs Track)

### CP
2.5

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<tr>
<td></td>
<td>JTBQ-011</td>
<td>Biotechnology: From Science to Business</td>
<td>Lecture - Tutorial</td>
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<th>Mandatory Status</th>
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<tr>
<td>Marcelo Fernandez Lahore</td>
<td>• Jacobs Track - Big Questions</td>
<td>• Mandatory for Chemistry</td>
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<tr>
<td></td>
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<td>• Mandatory elective for students of all undergraduate study except IEM</td>
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### Entry Requirements

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<th>Frequency</th>
<th>Forms of Learning and Teaching</th>
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<tr>
<td>None</td>
<td>None</td>
<td>the ability and openness to engage in interdisciplinary issues on bio-based value creation</td>
<td>annually</td>
<td>• Lecture and Tutorial (17.5 hours)</td>
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<td>media literacy, critical thinking and a proficient handling of data sources</td>
<td></td>
<td>• Private Study (45 hours)</td>
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### Recommendations for Preparation
- [https://www.ctsi.ucla.edu/researcher-resources/files/view/docs/EGBS4_Kolchinsky.pdf](https://www.ctsi.ucla.edu/researcher-resources/files/view/docs/EGBS4_Kolchinsky.pdf)
- [https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf](https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf)

### Duration
- 1 semester

### Workload
- 62.5 hours