One of the largest challenges facing humankind in the 21st century is the transition from petrochemistry to the ‘biobased’ production of transportation fuels, chemicals and pharmaceuticals. The TU Delft MSc programme in Life Science & Technology (LST) focuses on the understanding and engineering of enzymes and of the microbial cells and populations that are needed in order to design innovative industrial processes. The programme trains students to drive discovery that will form the foundation of the biobased society of the future.

Biotechnological production methods are already of great importance in the pharmaceutical, chemical and food industries. The MSc programme in Life Science & Technology addresses the understanding of enzymes, living cells and biotechnological processes. Based on this understanding, students are taught how to design (or redesign) new, sustainable ways of making a wide range of products, including biofuels, pharmaceuticals and clean drinking water.

The multidisciplinary area covered by Life Science & Technology integrates the disciplines of Biology, Chemistry (including Biochemistry), Engineering, Computer Science and Mathematics. This area is ‘booming’ due to recent spectacular progress in the biological sciences, as well as in technological developments related to the high throughput, sensitive analysis of living systems. In general, Life Science & Technology is expected to contribute to important challenges that face the growing human population in the present century. The integration of fundamental science and engineering will play a key role in realising many breakthrough innovations, ranging from the development of novel, life saving antibiotics to the microbial production of new, sustainable ‘biobased’ airplane fuels. The MSc programme in Life Science & Technology seeks to train the scientists and engineers who will transform these and other important breakthroughs into reality.
Curriculum Life Science & Technology

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<th>First Year (60 EC)</th>
<th>2nd semester</th>
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<tr>
<td>1st semester</td>
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<tr>
<td>Core courses (12 EC)</td>
<td>Specialisation courses (6 EC)</td>
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<td>Analysis of Metabolic Networks (5 EC)</td>
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<tr>
<td>Introduction to Algorithmics &amp; Programming Skills (1 EC)</td>
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<td>Bioprocess Integration (6 EC)</td>
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<td>Specialisation courses (12 EC)</td>
<td>(part of) Elective courses (12 EC)</td>
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<td>(part of) Elective courses (12 EC)</td>
<td>Design Project (12 EC) and Ethics (3 EC)</td>
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<th>Second Year (60 EC)</th>
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<tr>
<td>Industrial Internship (18 EC) and Research and Master’s thesis (45 EC)</td>
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1 EC = 28 hours of study, according to the European Credit Transfer System (ECTS)
Total number of credits in the MSc programme = 120 EC
For more information on all courses: lst.msc.studyguide.tudelft.nl

Programme
In the Life Science & Technology programme, we examine objects of various scales: the nanometers of biomolecules, the micrometers of living cells or the meters of bioproduction processes. Similarly, the objects of design and engineering in Life Science Technology can range from the changing molecular structure of substrates and enzymes, through the reprogramming of metabolism and its regulation in cells, to the design of novel process concepts in biotechnological plants. These order-of-magnitude differences in the dimensions of the matter that we seek to study fundamentally alter technologically form the foundations for the three programme specialisations: Biocatalysis, Cell Factory and Biochemical Engineering.

The Biocatalysis specialisation integrates enzymological, bioprocess, biochemical, bioorganic and proteinanalytical knowledge, with the aim of imparting an understanding of the principles of biocatalysis (i.e. what do enzymes look like and how do they work?). The specialisation covers theoretical aspects of biocatalysis and a wide range of techniques for their study and application.

Specialisation Courses:
- Advanced Biocatalysis
- Advanced Enzymology
- Proteomics

The Cell Factory specialisation focuses on the understanding, optimisation and design (or re-design) of living cells as economically and environmentally sustainable production systems. The specialisation covers key concepts and technologies that are needed in the engineering of microbial cells and communities for the production of valuable substances ranging from car fuels to pharmaceuticals.

Specialisation Courses:
- Metabolic Reprogramming
- Molecular Biotechnology & Genomics
- Microbial Community Engineering

The Biochemical Engineering specialisation is concerned with engineering and the design (or re-design) of sustainable industrial production processes and waste treatment processes involving cells or their constituents (e.g. enzymes). The profile focuses on understanding the relevant biological and physicochemical sub-processes, as well as on the use of mathematical models to predict and optimise industrial processes.

Specialisation Courses:
- Fermentation Technology & Environmental Biotechnology
- Transport & Separation
- Numerical Methods, Modelling & Simulation Techniques

Career Prospects
This programme aims to equip students with both theoretical and applied knowledge and expertise, thereby preparing them for careers in both industrial and academic environments. The biotech, food and biopharmaceutical industries offer a variety of interesting career opportunities. Alternatively, graduates may enter the healthcare field or take positions at fundamental research institutions. From a recent monitor of Life Science & Technology alumni over the last 5 years the following distribution of job areas transpires:
- circa 40% research jobs in multinational Biotech companies,
- circa 50% continues in a PhD-trajectory,
- circa 10% is found in a variety of jobs (research and management in start-up companies, decision making in, e.g., ministries, first-degree teaching in secondary education). Read more on: www.careercentre.tudelft.nl
Admission requirements and application procedures

BSc degree from a Dutch university
All students possessing a certificate proving that they have successfully completed their Bachelor of Science studies in Life Science & Technology or equivalent will be admitted to the programme. These equivalencies and a description of the entry levels, are laid down in www.doorstroommatrix.nl

Application proceeds through Studielink: www.tudelft.studielink.nl

It is highly recommended to contact the Master’s Coordinator before applying.

Degree from a Dutch university of applied sciences (Dutch HBO)
A Bachelor’s degree from a university of applied sciences does not qualify you for direct admission to a Master’s degree programme at TU Delft. The Bachelor’s degree in applied sciences must be completed within the nominal duration of the programme, with a gradeweighted average of 75% for all study components. In order to start the Master’s degree programme in LST, you might first need to complete a supplementary programme in order to bring your knowledge to the required level. Bridging programmes for the MSc programme are always customised, and they can be completed either during or after your studies at the university of applied sciences. Entrance examinations in mathematics and English must be taken before the start of the programme (or the bridging programme). For additional details, see: www.hbodoorstroom.tudelft.nl www.tudelft.studielink.nl

International applicants
International applicants must meet the general admission requirements of TU Delft.

1. A BSc degree (or a proof that you have nearly completed a BSc programme) in Life Science & Technology or equivalent (such as Biochemical Engineering, Biochemistry, Biotechnology, Chemical Engineering).
2. A BSc Cumulative Grade Point Average (CGPA) of at least 75% of the scale maximum
3. A score of at least 90 on the TOEFL (internet-based test) and a minimum of 21 for each section. Or an IELTS with an overall Band score of at least 6.5 and a minimum of 6.0 for each section. Or proof that you have passed the University of Cambridge ‘Certificate of Proficiency in English’ with a minimum grade B or the University of Cambridge ‘Certificate in Advanced English.’

The application period starts in October and closes at 1 April. To start an MSc application, please complete the online application and pay the refundable application fee of € 100. Next, you will receive an email with the link to upload the required documents.

For more information about the application procedure and studying at TU Delft in general, go to www.admissions.tudelft.nl

Please note that you should apply early, before 1 December, if you wish to apply for a scholarship as well.

For further information
Please visit the webpage for all details, complete requirements, deadlines and contact information: www.lst.msc.tudelft.nl

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www.campus.tudelft.nl

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