

COURSE GUIDE – extended form

Academic year 2026 – 2027

1. Program information

1.1 University	<i>Université de Rouen Normandie (URN)</i>
1.2 Faculty	
1.3 Department	<i>UFR Sciences et Techniques – Department of Biology</i>
1.4 Field	<i>Microbiology</i>
1.5 Study level	<i>Master 2</i>
1.6 Specialization	<i>Chemical and Biochemical Process Technology - CBPT</i>

2. Course information

2.1.1 Course name	Technology, innovation and Industrial Microbiology (sub-courses of UE Technology and Innovation in Microbiology and UE Industrial Microbiology and Biotechnology 1/2, Master of Microbiology Health, Well-being and Industry)		
2.1.2 Course code		2.1.3. Course category	Fundamental/Specialized/Complementary)
2.2 Course instructor	P. Thebault, C. Duclairoir Poc, E. Bouffartigues (Maillot), O. Lesouhaitier, J. Hardouin, C. Barbey, R. Ismail, J. Vieillard		
2.3 Course instructors for applied activities (S, L, P, Pr)	n/a		
2.4 Year of study ²		2.5 Semester ³	
		2.6 Evaluation type ⁴	
		2.7 Course type ⁵	

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	1.5	3.2 course		3.3a sem.		3.3b laboratory		3.3c project		3.3.d. practice	
3.4 Total hours from curriculum ⁶	21	3.5 course		3.6a sem.		3.6b laboratory		3.6c project			
Time spent for related activities ⁷										Hours	
Study of recommended books, course support, scientific papers and course notes										40	
Study in library and practical skills development										43	
Preparation of seminars / laboratory works / project phases / home works / presentations										0	
Evaluation ⁸										4	
Other activities:											
3.7 Total hours of individual study ⁹		83									
3.8 Total hours per semestre ¹⁰		108									
3.9 Number of credits		4									

4. Prerequisites (optional)

4.1 curriculum ¹¹	A solid understanding of basic concepts at the undergraduate level in microorganism biology, molecular and cell biology is required to successfully follow this course.
4.2 learning outcomes	Introduce students to technological, analytical, and regulatory approaches relevant to industrial microbiology in areas of interest, with a focus on innovations and modern tools (interactomics, proteomics, microscopy, biosensors) and quality standards.

5. Requirements

5.1 Conditions for course delivery ¹²	Blackboard, video projector. All digital course materials and resources will be provided through the university's virtual learning environment (UniversiTICE).
5.2 Seminar / Laboratory / Project delivery requirements ¹³	Blackboard, video projector. All digital course materials and resources will be provided through the university's virtual learning environment (UniversiTICE).

	Some learning activities and coursework may involve frequent use of digital tools and computer-based resources.
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6. Overall objective of the course

Through a combination of theoretical courses selected from the Master's program in Microbiology, Health, Well-being and Industry at URN, students will explore technological approaches based on -omics and advanced analytical instruments to monitor and control the microbiological quality of various products.

Special attention will be given to regulatory frameworks such as Good Manufacturing Practices, as well as to the evaluation of microbiological safety in areas of interest such as pharmaceuticals, cosmetics, and biotechnology.

7. Learning outcomes

Knowledge	The student / graduate: By the end of the course, students are expected to demonstrate a solid understanding of key methods and technologies used in industrial microbiology and pharmaceutical processes
Skills	The student / graduate: <ul style="list-style-type: none"> - Understand and apply innovative approaches in microbiology - Interpret omics data - Understand and apply microscopy techniques - Understand fermentation processes - Assess microbiological quality and evaluate alternative decontamination methods
Responsibility and autonomy	The student / graduate: <ul style="list-style-type: none"> - Use advanced digital tools for data analysis. - Communicate scientific results effectively in written and oral English. - Contribute to a collaborative scientific analysis. - Demonstrated ability to perform bibliographic monitoring and literature reviews on bacterial resistance and anti-infective therapies.

8. Teaching methods

The teaching process will involve participatory lectures and discussions, supported by PowerPoint presentations made available to students if necessary. These presentations include images, texts and diagrams to make the information easier to understand and assimilate. Each course/seminar may be accompanied by additional readings provided by the instructor.

The teaching method is also based on activities in the fields to illustrate or develop a piece of knowledge or specific skills (Self-assessments and reports on readings or case studies). Collaborative activities may be organized to foster peer interaction and teamwork among students.

Autonomy, adherence to instructions, and a positive attitude toward learning will be actively encouraged and developed throughout the course.

9. Course content

9.1. Courses ¹⁵	Teaching methods	Time allocation
9.1.1. Surface Plasmon Resonance (SPR)	<i>Interactive lecture</i> <i>Guided discussions</i> <i>Clarifying explanations</i>	2 hours
9.1.2. Pharmaceuticals industry : process and regulatory compliance (GMPs)		2 hours
9.1.3 Focused on interactomics: exploring genetic, biophysical, and bioinformatic tools		1 hour
9.1.4. Focused on interactomics: Microscale thermophoresis		1 hour
9.1.5 Proteomics/MS Applications in Microbiology and Biotechnology		4 hours
9.1.6 Microscopy-Based Approaches		2 hours

9.1.7 Fermentation Processes in Industrial Microbiology		2 hours
9.1.8 Lab-on-chip and Biosensors		1 hour
9.1.8 Decontamination alternative methods		2 hours
9.1.9 Microbiological quality assessment of cosmetics		2 hours
<p>Course bibliography: Scientific literature relevant to the topics covered—such as anti-biofilm strategies, anti-persister approaches, discovery of bioactive compounds, biotechnological developments, and therapeutic strategies—will be used to support the understanding and critical analysis of key concepts presented in course. Relevant quality guidelines may be applied as needed. All sources, documents, and references used during the course sessions (including articles, book excerpts, presentation slides, videos, etc.) will be made available to students through the designated platform. This includes both required readings and supplementary resources intended to deepen understanding of the topics covered in class. Students are encouraged to consult these materials regularly to support their learning and active participation.</p>		
<p>Bibliography for applied activities (seminar / laboratory / project): This section should include reference titles and materials developed by the course instructor(s), available in printed and/or electronic format — such as problem books, laboratory guides, project manuals, etc.</p>		

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation method	10.3 Percentage of the final grade (recommended to be proportional to the number of hours allocated to each type of activity)
10.4 Type of evaluation: Final Exam / Assessment	<i>Completeness and correctness of knowledge.</i> <i>Logical coherence, fluency, strength of argumentation.</i> <i>Capacity for analysis, personal interpretation, originality, creativity.</i> <i>Degree of mastery of specialized terminology and communication skills.</i> <i>Ability to apply acquired skills.</i> <i>Ability to process data and solve given problems.</i>	<i>Summative assessment test (final evaluation).</i>	100%
10.6 Conditions for passing			
The final grade corresponds to the weighted average of all results obtained from exams and assessed activities completed by the student. Grades are expressed on a scale from 0 to 20. A score of 10/20 indicates that the student has acquired the minimum required knowledge and skills, and is sufficient to validate the ECTS credits.			

Date:

Course instructor: P. Thebault, C. Duclairoir Poc, E. Bouffartigues (Maillot), O. Lesouhaitier, J. Hardouin, C. Barbey, R. Ismail, J. Vieillard

Course instructors for applied activities:

Date of approval by the department:

Head of Department: Anthony Delaune

Date of approval by the Faculty Council:

Dean,