



**UNIVERSITÀ  
DI SIENA  
1240**

## General Information

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| <b>Title</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Postgraduate Master's Programme (First-level): <b>Predictive molecular pathology: from diagnosis to research</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Educational Objectives</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| The Master's Programme aims to train professionals working in precision medicine by providing in-depth scientific and technical knowledge of molecular pathology, with particular reference to molecular diagnostics in the various fields of human pathology. Participants will acquire expertise in precision medicine, a constantly evolving and expanding field that requires specialised and professionally oriented training. The programme will provide up-to-date knowledge of the latest and most innovative molecular investigation methods and indications for determining predictive parameters of response to targeted therapy in tissue and/or cytological samples and liquid biopsies, as well as the analysis of omics data. This background is essential to support an interdisciplinary approach to patient diagnosis and treatment. |
| <b>Credits (CFU/ECTS)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Total Hours</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 1500                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Programme Duration (months)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Application/Enrolment Deadline</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>15 October 202x</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Start Date</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| November 2026                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>End Date</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| October 2027                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Maximum Percentage of Permitted Absences</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 20%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

|                                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Website</b><br>//                                                                                                                   |
| <b>Language of Instruction</b><br>Italian; English                                                                                     |
| <b>Department</b><br>Department of xxx (Dipartimento di xxx - xxx)                                                                     |
| <b>Teaching Contact</b><br>Prof.ssa Cristiana Bellan - e-mail <a href="mailto:cristiana.bellan@unisi.it">cristiana.bellan@unisi.it</a> |

### Agreements and Partnerships

|                                                                  |
|------------------------------------------------------------------|
| <b>Agreements or Partnerships</b><br>No agreement or partnership |
|------------------------------------------------------------------|

### Admission Requirements

| Class         | Description                                                                                | Degree Type |
|---------------|--------------------------------------------------------------------------------------------|-------------|
| Classe L1     | Biotechnology                                                                              | L           |
| Classe L-2    | Biotechnology (new university system pursuant to d.m. 270/2004)                            | L           |
| Classe SNT1   | Nursing and Midwifery Health Professions                                                   | L           |
| Classe L/SNT1 | Nursing and Midwifery Health Professions (new university system pursuant to d.m. 270/2004) | L           |
| Classe SNT3   | Technical Health Professions                                                               | L           |
| Classe L/SNT3 | Technical Health Professions (new university system pursuant to d.m. 270/2004)             | L           |
| Classe L12    | Biological Sciences                                                                        | L           |
| Classe L-13   | Biological Sciences (new university system pursuant to d.m. 270/2004)                      | L           |
| Classe L-27   | Chemical Sciences and Technologies (new university system pursuant to d.m. 270/2004)       | L           |
| Classe L-29   | Pharmaceutical Sciences and Technologies (new university system pursuant to d.m. 270/2004) | L           |
| Classe L-31   | Computer Science and Technologies (new university system pursuant to d.m. 270/2004)        | L           |
| Classe LM-6   | Biology (new university system pursuant to d.m. 270/2004)                                  | LM          |
| Classe LM-8   | Industrial Biotechnology (new university system pursuant to d.m. 270/2004)                 | LM          |

# Predictive molecular pathology: from diagnosis to research

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|------|
| Classe LM-9                                                                                                                                                                                                                                                                                                                                           | Medical, Veterinary and Pharmaceutical Biotechnology (new university system pursuant to d.m. 270/2004) | LM   |
| Classe LM-18                                                                                                                                                                                                                                                                                                                                          | Computer Science (new university system pursuant to d.m. 270/2004)                                     | LM   |
| Classe LM-21                                                                                                                                                                                                                                                                                                                                          | Biomedical Engineering (new university system pursuant to d.m. 270/2004)                               | LM   |
| Classe LM-41                                                                                                                                                                                                                                                                                                                                          | Medicine and Surgery (new university system pursuant to d.m. 270/2004)                                 | LM   |
| Classe LM/SNT3                                                                                                                                                                                                                                                                                                                                        | Technical Health Professions Sciences                                                                  | LM   |
| Classe LM/SNT1                                                                                                                                                                                                                                                                                                                                        | Nursing and Midwifery Sciences                                                                         | LM   |
| Classe LS6                                                                                                                                                                                                                                                                                                                                            | Biology                                                                                                | LS   |
| Classe LS9                                                                                                                                                                                                                                                                                                                                            | Medical, Veterinary and Pharmaceutical Biotechnology                                                   | LS   |
| Classe LS14                                                                                                                                                                                                                                                                                                                                           | Pharmacy and Industrial Pharmacy                                                                       | LS   |
| Classe LS26                                                                                                                                                                                                                                                                                                                                           | Biomedical Engineering                                                                                 | LS   |
| Classe LS35                                                                                                                                                                                                                                                                                                                                           | Computer Engineering                                                                                   | LS   |
| Classe LS46                                                                                                                                                                                                                                                                                                                                           | Medicine and Surgery                                                                                   | LS   |
| Classe SNT LS3                                                                                                                                                                                                                                                                                                                                        | Technical Health Professions Sciences                                                                  | LS   |
| Classe SNT LS1                                                                                                                                                                                                                                                                                                                                        | Nursing and Midwifery Sciences                                                                         | LS   |
| -                                                                                                                                                                                                                                                                                                                                                     | Pharmaceutical Biotechnology                                                                           | V.O. |
| -                                                                                                                                                                                                                                                                                                                                                     | Medical Biotechnology                                                                                  | V.O. |
| -                                                                                                                                                                                                                                                                                                                                                     | Pharmacy                                                                                               | V.O. |
| -                                                                                                                                                                                                                                                                                                                                                     | Biomedical Engineering                                                                                 | V.O. |
| -                                                                                                                                                                                                                                                                                                                                                     | Medical Engineering                                                                                    | V.O. |
| -                                                                                                                                                                                                                                                                                                                                                     | Medicine and Surgery                                                                                   | V.O. |
| -                                                                                                                                                                                                                                                                                                                                                     | Biological Sciences                                                                                    | V.O. |
| -                                                                                                                                                                                                                                                                                                                                                     | Biology                                                                                                | DU   |
| -                                                                                                                                                                                                                                                                                                                                                     | Nurse                                                                                                  | DU   |
| -                                                                                                                                                                                                                                                                                                                                                     | Medical and Scientific Information Officer                                                             | DU   |
| -                                                                                                                                                                                                                                                                                                                                                     | Biomedical Engineering                                                                                 | DU   |
| -                                                                                                                                                                                                                                                                                                                                                     | Computer Engineering                                                                                   | DU   |
| -                                                                                                                                                                                                                                                                                                                                                     | Biomedical Laboratory Technician                                                                       | DU   |
| -                                                                                                                                                                                                                                                                                                                                                     | Medical Laboratory Technician                                                                          | DU   |
| -                                                                                                                                                                                                                                                                                                                                                     | Pharmaceutical Technologies                                                                            | DU   |
| Degree class abbreviations - L: Bachelor's Degree; LS: Specialist Degree; LM: Master's Degree; V.O.: Pre-reform Degree; DU: University Diploma                                                                                                                                                                                                        |                                                                                                        |      |
| The qualifications listed above refer to the Italian higher education system. Applicants holding an academic qualification obtained abroad may apply provided that it is deemed comparable, solely for admission purposes, in terms of level, nature, content and academic rights, to the Italian qualification required for admission to the Course. |                                                                                                        |      |

Other diplomas referred to in Law No. 42 of 26 February 1999 and Law No. 251 of 10 August 2000, as implemented by Law No. 1 of 8 January 2002 (limited to nursing, midwifery, rehabilitation, technical health and prevention professions, and holders of a Social Work diploma).

### Application for Admission or Enrolment

|                                                      |
|------------------------------------------------------|
| <b>Admission/Enrolment Procedure</b>                 |
| Direct enrolment on a first-come, first-served basis |
| <b>Minimum Number of Enrolments</b>                  |
| 5                                                    |
| <b>Maximum Number of Places Available</b>            |
| 20                                                   |

### Enrolment Fees

|                                   |
|-----------------------------------|
| <b>Total Amount (€)</b>           |
| 3000                              |
| <b>First Instalment (€)</b>       |
| 1500                              |
| <b>Second Instalment (€)</b>      |
| 1500                              |
| <b>Second Instalment Deadline</b> |
| Monday, 10 May 2027               |

### Programme Structure

|                                                            |
|------------------------------------------------------------|
| <b>Mode of Delivery</b>                                    |
| Distance learning (synchronous online classes)             |
| <b>Venue</b>                                               |
| Department of Medical Biotechnologies, University of Siena |

**Subject Area: ONCOLOGICAL MOLECULAR PATHOLOGY**

**Total Subject Area Credits: 10**

**Subject Area Coordinators:** Bellan Cristiana - Giordano Antonio - Mari Francesca

*Learning Activity:* OUTLINES OF SYSTEMICAL PATHOLOGICAL ANATOMY

*Credits (CFU/ECTS): 3*

*Italian Scientific-Disciplinary Sector - SSD: MED/08 - PATHOLOGICAL ANATOMY*

*Learning Activity:* GENETICS OF TUMORS

*Credits (CFU/ECTS): 1*

*Italian Scientific-Disciplinary Sector - SSD: MED/03 - MEDICAL GENETICS*

*Learning Activity:* THE CLINIC'S POINT OF VIEW

*Credits (CFU/ECTS): 4*

*Italian Scientific-Disciplinary Sector - SSD: MED/06 - MEDICAL ONCOLOGY*

*Learning Activity:* PROGNOSTIC/ PREDICTIVE MARKERS OF RESPONSE TO TARGET THERAPY IN ONCOLOGY

*Credits (CFU/ECTS): 2*

*Italian Scientific-Disciplinary Sector - SSD: MED/08 - PATHOLOGICAL ANATOMY*

**Subject Area: FARMACOGENETICA, FARMACOGENOMICA E FARMACOLOGIA ONCOLOGICA E TECNICHE DI BIOLOGIA MOLECOLARE APPLICATE ALL'ANATOMIA PATOLOGICA**

**Total Subject Area Credits: 4**

**Subject Area Coordinators:** Donnini Sandra - Guazzo Raffaella

*Learning Activity:* PHARMACOGENETICS, PHARMACOGENOMICS AND ONCOLOGICAL PHARMACOLOGY

*Credits (CFU/ECTS): 1*

*Italian Scientific-Disciplinary Sector - SSD: BIO/14 - PHARMACOLOGY*

*Learning Activity:* MOLECULAR BIOLOGY TECHNIQUES APPLIED TO PATHOLOGICAL ANATOMY

*Credits (CFU/ECTS): 2*

*Italian Scientific-Disciplinary Sector - SSD: MED/46 - MEDICAL AND LABORATORY TECHNICAL SCIENCES*

*Learning Activity:* IN SITU MOLECULAR AND ELECTRON MICROSCOPY TECHNIQUES

*Credits (CFU/ECTS): 1*

*Italian Scientific-Disciplinary Sector - SSD: MED/46 - MEDICAL AND LABORATORY TECHNICAL SCIENCES*

**Subject Area: BIOPSIA LIQUIDA**

**Total Subject Area Credits: 3**

**Subject Area Coordinators:** Antonuzzo Lorenzo - Frullanti Elisa - Palmieri Maria

*Learning Activity:* THEORETICAL BASIS OF LIQUID BIOPSY

*Credits (CFU/ECTS): 1*

*Italian Scientific-Disciplinary Sector - SSD: BIO/18 - GENETICS*

*Learning Activity:* BASIC FUNDAMENTALS OF LIQUID BIOPSY AND ITS APPLICATIONS

*Credits (CFU/ECTS):* 1

*Italian Scientific-Disciplinary Sector - SSD:* BIO/18 - GENETICS

*Learning Activity:* APPLICATIONS OF LIQUID BIOPSY IN MOLECULAR DIAGNOSIS

*Credits (CFU/ECTS):* 1

*Italian Scientific-Disciplinary Sector - SSD:* MED/06 - MEDICAL ONCOLOGY

**Subject Area: BIOINFORMATICS AND FUNCTIONAL PROCESSING OF OMICS DATA**

**Total Subject Area Credits:** 3

**Subject Area Coordinators:** Bianchi Laura - Bini Luca

*Learning Activity:* DATA ANALYSIS FROM OMICS SCIENCES (TRANSCRIPTOMICS - PROTEOMICS)

*Credits (CFU/ECTS):* 1

*Italian Scientific-Disciplinary Sector - SSD:* BIO/10 - BIOCHEMISTRY

*Learning Activity:* BASIC FUNDAMENTALS OF BIOINFORMATICS

*Credits (CFU/ECTS):* 1

*Italian Scientific-Disciplinary Sector - SSD:* SECS-S/01 - STATISTICS

*Learning Activity:* OMICS SCIENCES

*Credits (CFU/ECTS):* 1

*Italian Scientific-Disciplinary Sector - SSD:* BIO/10 - BIOCHEMISTRY

**Subject Area: ADVANCED BIOTECHNOLOGIES APPLICATION TO DIAGNOSTICS AND RESEARCH**

**Total Subject Area Credits:** 4

**Subject Area Coordinators:** Barbarino Marcella - Cortellino Salvatore - Giordano Antonio - Graziano Antonio

*Learning Activity:* BIOTECHNOLOGIES APPLIED TO RESEARCH 1

*Credits (CFU/ECTS):* 1

*Italian Scientific-Disciplinary Sector - SSD:* MED/08 - PATHOLOGICAL ANATOMY

*Learning Activity:* BIOTECHNOLOGIES APPLIED TO RESEARCH 2

*Credits (CFU/ECTS):* 1

*Italian Scientific-Disciplinary Sector - SSD:* BIO/11 - MOLECULAR BIOLOGY

*Learning Activity:* EXPERIMENTAL PATHOLOGY AND TUMOR MICROENVIRONMENT

*Credits (CFU/ECTS):* 1

*Italian Scientific-Disciplinary Sector - SSD:* MED/04 - GENERAL PATHOLOGY

*Learning Activity:* BIOCHEMICAL AND CELLULAR TECHNOLOGIES

*Credits (CFU/ECTS):* 1

*Italian Scientific-Disciplinary Sector - SSD:* BIO/11 - MOLECULAR BIOLOGY

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| <b>Internship/Placement</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Internship                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Internship/Placement Activities</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Students will develop an understanding of and apply the principles and analytical techniques used in molecular biology laboratories for histopathological diagnostics and applied research. They will have the opportunity to work with the latest techniques for determining prognostic and predictive parameters of response to targeted therapy already used in routine practice (Real-Time PCR, NGS and NanoString), as well as molecular techniques used in biomedical research.                                       |
| <b>Internship/Placement Venue</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| The internship will be carried out at the laboratories of the Department of Medical Biotechnologies of the University of Siena and at other institutions to be identified at a later stage. Internship activities completed at institutions other than Siena may be recognised, provided that specific agreements are concluded according to candidates' needs and subject to the approval of the Programme Director. Internship activities will be defined through a specific programme established by the Teaching Board. |
| <b>Credits Awarded for the Internship/Placement</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 26 CFU/ECTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Internship/Placement Hours</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 650                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Internship/Placement Completion Date</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| September 2027                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Internship/Placement Supervisors:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Bellan Cristiana - Giordano Antonio                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

|                                                                                                                                                                                                                                                                                                             |
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| <b>Intermediate Assessment Methods</b>                                                                                                                                                                                                                                                                      |
| Intermediate assessments will consist of a written test with 10 multiple-choice questions. Successful completion of the intermediate assessments does not result in the award of CFU/ECTS credits, since they form part of the Examination Committee's evaluation for the purposes of the final assessment. |
| <b>Final Assessment Method</b>                                                                                                                                                                                                                                                                              |
| Dissertation or final project; oral examination aimed at assessing the knowledge acquired                                                                                                                                                                                                                   |
| <b>Credits Awarded for the Final Assessment</b>                                                                                                                                                                                                                                                             |
| 10                                                                                                                                                                                                                                                                                                          |

### **Governing Bodies**

|                                        |
|----------------------------------------|
| <b>Teaching Board</b>                  |
| Body composed of all Area Coordinators |
| <b>Executive Board</b>                 |
| Yes                                    |