CALL FOR APPLICATIONS FOR ADMISSION TO THE FIRST CYCLE DEGREE PROGRAMMES IN THE HEALTHCARE PROFESSIONS
ACADEMIC YEAR 2017/2018

THE RECTOR

HAVING REGARD TO

Law no. 264 of 02 August 1999 regulating access to university programmes;

HAVING REGARD TO

Ministerial Decree no. 270 of 22 October 24, “Amendments to the regulations on the educational autonomy of universities” (Modifiche al regolamento recante norme concernenti l’autonomia didattica degli atenei) approved with Decree of the Minister for Universities and Scientific and Technological Research no. 509 of 3 November 1999;

HAVING REGARD TO

Ministerial Decree no. 477 of 28 June 2017 that defines the admission exam procedures and contents on a national level for first cycle degree programmes with admission quota for the academic year 2017/2018;

HAVING REGARD TO

The decisions of the responsible academic bodies concerning admission procedures;

DECREES

Pending the ministerial decree that establishes the number of places available for each degree programme, admission to the degree programmes in the healthcare professions for academic year 2017/2018 is through a competitive exam, as set out in this call for applications.

Art. 1 - Admission requirements

Applicants with an upper secondary school diploma or equivalent qualification obtained abroad can take the admission exam.

Foreign qualifications are valid if obtained after at least 12 years of schooling. If the local education system provides 11 or 10 years of schooling, the qualification is valid if supplemented by one or two years of university study, respectively, and if all exams scheduled for the years attended have been passed. The years of university study can be substituted by a post-secondary qualification awarded by a non-university higher education institute. Further information about the foreign qualifications valid for access to University is contained in the relevant annual Ministerial provisions, in particular in the attachments 1 and 2, published on the Ministry website: http://www.studiare-in-italia.it/studentistranieri/.
The eligibility of the foreign qualification in any case is assessed by the University having regard to the ministerial instructions on the subject and in implementation of bilateral applicable agreements.

EU and non-EU citizens who hold a Residence Permit issued in accordance with art. 26 of law no. 189 of 30 July 2002 have access to university education under the same conditions as Italian students.

Citizens of Norway, Iceland, Liechtenstein, Switzerland, the Republic of San Marino, refugees and beneficiaries of subsidiary protection, personnel serving in foreign diplomatic missions and in international bodies with headquarters in Italy - accredited by the Italian State or the Holy See - as well as their dependent family members (spouses and children only) are considered equivalent to EU citizens.

Non-EU applicants resident abroad access with the procedures and the limitations provided by the mentioned ministerial instructions.

Admission to the degree programmes in the healthcare professions is subject to a medical check up to ascertain whether the applicant is physically and mentally fit to undertake the specific functions of the single profession.

**Art. 2 - Number of places available**

Pending the ministerial decree that determines the number of places available at each University, the number of places available for each degree programme is for now as follows:

**Table 1 - Number of places available (provisional, they may increase or decrease)**

<table>
<thead>
<tr>
<th>Degree programme</th>
<th>Places</th>
<th>Places reserved for non-EU students resident abroad</th>
<th>Places reserved for students of the “Marco Polo” project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing (class L/SNT1)</td>
<td>580</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Paediatric nursing (class L/SNT1)</td>
<td>15</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Obstetrics (class L/SNT1)</td>
<td>39</td>
<td>1 (Mantua campus)</td>
<td>0</td>
</tr>
<tr>
<td>Podiatry (class L/SNT2)</td>
<td>23</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Physiotherapy (class L/SNT2)</td>
<td>94</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Speech and language therapy (class L/SNT2)</td>
<td>69</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Orthoptics and Ophthalmologic assistance (class L/SNT2)</td>
<td>12</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Psychiatric rehabilitation techniques (class L/SNT2)</td>
<td>22</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Occupational therapy (class L/SNT2)</td>
<td>22</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Art. 3 - Registering for the admission exam and deadlines

All applicants must register for the admission exam online starting from 17 July 2017 and no later than 12 noon on 28 August 2017.

To register, applicants must follow the procedure below:

1. Register on the University portal through the page https://www.unimi.it/registrazione/ENG/registra.keb (not required of those already registered on the portal or in possession of University login credentials)

2. Access the online application services using their credentials: http://www.unimi.it/hpsifa/ENG/nonProfiledPage_100.html
   Applicants must select the until three degree programmes in order of preference when filling out the application.

3. Pay the € 50.00 fee in one of the following ways:

### Degree programme | Places | Places reserved for non-EU students resident abroad | Places reserved for students of the “Marco Polo” project
---|---|---|---
Professional education (class L/SNT2) | 80 | 1 | 1
Developmental Neuro and Psychomotor Therapy (class L/SNT2) | 45 | 1 | 0
Audiometric techniques (class L/SNT3) | 15 | 1 | 0
Biomedical laboratory techniques (class L/SNT3) | 26 | 5 | 0
Medical imaging and radiotherapy techniques (class L/SNT3) | 25 | 1 | 0
Neurophysiopathology techniques (class L/SNT3) | 8 | 1 | 0
Audioprosthetic techniques (class L/SNT3) | 23 | 1 | 0
Cardiocirculatory Physiopathology and Cardiovascular Perfusion techniques (class L/SNT3) | 13 | 2 | 0
Dental Hygiene (class L/SNT3) | 47 | 0 | 1
Dietetics (class L/SNT3) | 20 | 3 | 0
Healthcare assistance (class L/SNT4) | 30 | 0 | 0
Environment and Workplace Safety Techniques (class L/SNT4) | 18 | 2 | 0
Orthopaedics techniques (class L/SNT3) | 15 | 1 | 0
• using the “MAV” (notice of payment) form generated at the end of the online registration procedure;
• by credit card (the only accepted payment method for resident abroad applicants).

Without exception and on pain of exclusion, payment must be made by the deadline for registration.

The online admission form cannot be amended, nor it can be completed with additional documentations once it has been submitted.

The receipt issued at the end of the online registration procedure must be shown to the examining committee on the day of the exam.

The receipt is the only document accepted as proof of registration for the admission exam.

Applicants who provide false details or who do not meet the requirements will be excluded from the final ranking list.

Besides online university enrolment, non-EU applicants resident abroad, must also present an application for pre-enrolment to the Italian diplomatic office in their country of origin, in accordance with the methods and deadlines set out in current provisions regarding the enrolment of foreign students in university programmes published on the Ministry of Education, Universities and Research webpage: http://www.studiare-in-italia.it/studentistranieri/.

For admission to the degree programmes in the healthcare professions under the Faculty of Medicine and Surgery, students may, until all places available for each degree programme are assigned, express up to three options in order of preference for the programmes.

The declared order of preference is binding. The examining committee will compile a general ranking list based on merit that will report preferences expressed by candidates. The list of candidates admitted to each programme will be drawn up on the basis of this ranking list and taking into account the first option indicated by candidates. If necessary, in order to assign all places available, the second and then third options will be considered subsequently.

Applicants who enrol in the degree programmes in Nursing, Midwifery, Physiotherapy, Speech and Language Therapy, Professional Education, Dental Hygiene and Developmental Neuro and Psychomotor Therapy must also declare the preferred course location, indicating all the locations of each degree programme in order of preference.

The course locations for each degree programme and the number of places available are listed below:

Table 2 - Class L/SNT1: Nursing and Midwifery healthcare professions

<table>
<thead>
<tr>
<th>Degree programme</th>
<th>Location</th>
<th>No. of Places</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing</td>
<td>“San Paolo” Hospital- Milan</td>
<td>54</td>
</tr>
<tr>
<td>Degree programme</td>
<td>Location</td>
<td>No. of Places</td>
</tr>
<tr>
<td>------------------</td>
<td>----------</td>
<td>---------------</td>
</tr>
<tr>
<td>“Niguarda Cà Granda” Hospital - Milan</td>
<td></td>
<td>68</td>
</tr>
<tr>
<td>“Fatebenefratelli e Oftalmico” Hospital- Milan</td>
<td></td>
<td>34</td>
</tr>
<tr>
<td>“G. Salvini” Hospital- Garbagnate Milanese- presidio ospedaliero di RHO - MI</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>“Luigi Sacco” Hospital- Milan</td>
<td></td>
<td>39</td>
</tr>
<tr>
<td>“Ospedale di Circolo” Hospital - Melegnano, Presidio ospedaliero di Cernusco (MI)</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>“San Carlo” Hospital - Milan</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Ospedale Civile - Legnano (MI) - Presidio di Magenta</td>
<td></td>
<td>34</td>
</tr>
<tr>
<td>Ospedale di Circolo - Busto Arsizio (VA)</td>
<td></td>
<td>34</td>
</tr>
<tr>
<td>Centro I.R.C.C.S. “Santa Maria Nascente” - Fondazione “Don Carlo Gnocchi” - Milan</td>
<td></td>
<td>34</td>
</tr>
<tr>
<td>Fondazione I.R.C.C.S. Ca’ Granda Ospedale Maggiore Policlinico - Milan</td>
<td></td>
<td>49</td>
</tr>
<tr>
<td>I.R.C.C.S. Istituto Nazionale dei Tumori - Milan</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>I.R.C.C.S. Policlinico San Donato (MI)</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>San Giuseppe Hospital - Milan</td>
<td></td>
<td>39</td>
</tr>
<tr>
<td>Ospedale Maggiore di Crema Hospital (CR)</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>European Institute of Oncology (I.E.O.) - Milan</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>580</td>
</tr>
</tbody>
</table>

**Midwifery**

<table>
<thead>
<tr>
<th>Degree programme</th>
<th>Location</th>
<th>No. of Places</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Carlo Poma” Hospital - Mantua</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>Fondazione I.R.C.C.S. Ca’ Granda Ospedale Maggiore Policlinico - Milan</td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>39</td>
</tr>
<tr>
<td>Degree programme</td>
<td>Location</td>
<td>No. of Places</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Professional education</td>
<td>Centro I.R.C.C.S. “Santa Maria Nascente” - Fondazione “Don Carlo Gnocchi” - Milan</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>I.R.C.C.S. Eugenio Medea - Associazione La Nostra Famiglia - Bosisio Parini (LC)</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>80</td>
</tr>
<tr>
<td>Physiotherapy</td>
<td>“San Paolo” Hospital - Milan</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>“San Carlo” Hospital – Milan</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Centro I.R.C.C.S. “Santa Maria Nascente” – Fondazione “Don Carlo Gnocchi” – Milan</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>94</td>
</tr>
<tr>
<td>Speech and language therapy</td>
<td>“Carlo Poma” Hospital – Mantua</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>“Luigi Sacco” Hospital – Milan</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Centro I.R.C.C.S. “Santa Maria Nascente” – Fondazione “Don Carlo Gnocchi” – Milano</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>I.R.C.C.S. Eugenio Medea – Associazione La Nostra Famiglia – Bosisio Parini (LC)</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>69</td>
</tr>
<tr>
<td>Developmental Neuro and Psychomotor Therapy</td>
<td>Centro I.R.C.C.S. “Santa Maria Nascente” – Fondazione “Don Carlo Gnocchi” – Milan</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>I.R.C.C.S. Eugenio Medea – Associazione La Nostra Famiglia – Bosisio Parini (LC)</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>45</td>
</tr>
</tbody>
</table>
Table 4 - Class L/SNT 3: Technical Healthcare Professions

<table>
<thead>
<tr>
<th>Degree programme</th>
<th>Location</th>
<th>No. of Places</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental Hygiene</td>
<td>“San Paolo” Hospital- Milan</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Fondazione I.R.C.C.S. Ca’ Granda Ospedale Maggiore Policlinico – Milan</td>
<td>26</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>47</strong></td>
</tr>
</tbody>
</table>

The course location will be assigned taking into account the applicant’s stated preferences. Once places in the preferred locations are filled, a place will be assigned automatically.

**Important:** applicants should consider the course location carefully, taking into account distance from their home and the means of transport, given that no changes can be made once the ranking list is completed and locations are assigned.

**Art. 4 - Disabled applicants**

In order to ensure equal opportunities during the exam, applicants with disabilities who require extra time and/or specific aids - if in possession of a certificate of legal disability and/or acknowledgement of status of handicap under law 104/92 - must provide specific application (available at the following link: [http://www.unimi.it/cataloghi/segreterie/Application_disabled.pdf](http://www.unimi.it/cataloghi/segreterie/Application_disabled.pdf)) together with the above-mentioned certificate issued by the National Health Service or accredited specialists or facilities.

The scanned documents must be uploaded during the online admission procedure, by the 28 August 2017.

**Art. 5 - Applicants with SLD**

To the applicants with a diagnosis of specific learning disabilities (SLD) under law no. 170/2010 is granted an extra time until the 30% more time than that set for the other applicants. The committee will evaluate the received applications and, in order to ensure equal opportunities during the exam, will be able to consent the use of other compensatory tools taking into consideration the type of test to be taken and the type/degree of the candidate’s disability.

To be accorded the abovementioned measures, applicants with SLD must provide specific application (available at the following link: [http://www.unimi.it/cataloghi/segreterie/Application_sld.pdf](http://www.unimi.it/cataloghi/segreterie/Application_sld.pdf)) together with appropriate certification issued by the National Health Service or accredited specialists or facilities (issued no more than three years earlier if the applicant was underage at the time of the issuance of the certification).

The scanned documents must be uploaded during the online admission procedure, by the 28 August 2017.
Art. 6 - Examining committee
The examining committee is appointed by the appropriate academic body. During the exam the committee will be assisted by teaching and administrative staff, who will be responsible for supervising and identifying candidates.

Art. 7 - Examination programme and assessment criteria
The admission exam for first cycle degree programmes in the healthcare professions is set by the university and is identical for the various different programmes run by the university.

The admission exam touches on the following subjects:
- General culture and logical reasoning
- Biology
- Chemistry
- Physics and mathematics.

The programme for each subject is defined in Annex A, which is an integral part of the present announcement.

A maximum of 90 points can be scored in the test, as follows:
- 1.5 points for a correct answer
- minus 0.4 (-0.4) points for a wrong answer
- 0 points for no answer.

In the event of two or more applicants with the same score, priority will be given to the applicant with the higher score logical reasoning, general culture, biology, chemistry, physics and mathematics (in that order).

In the case of further equal scores, priority will be given to the younger applicant.

Within the limits of the places available for enrolment, are admitted to the programmes, in decreasing order of score, EU and non-EU applicants resident in Italy who comply with art. 26 law no. 189/2002, who obtained a minimum score of 20 points in the admission exam. Candidates who are not eligible are not included in the ranking list.

Are equally admitted, within the limits of the places reserved for them, in decreasing order of score, non-EU applicants resident abroad to whom is not applicable the threshold of the preceding subparagraph.

Candidates who are not eligible are not placed in the ranking list.

Non-EU citizens resident abroad and without an Italian residence permit, are placed in separate ranking lists to cover the places reserved as set out in article 2.

Art. 8 - Admission exam schedule and procedure
The admission exam will take place on 13 September 2017 at the Forum di Assago in Via Di Vittorio, 6 Assago.

Candidates must arrive at the examination room at 8.30 am, bearing the valid identity document indicated during registration for the admission exam. Candidates presenting
without documents, with invalid documents or arriving late will not be admitted to the exam.

The exam begins at 11 am. The time allotted is 100 minutes.

During the exam applicants cannot leave the room, use handwritten notes, texts of any kind, calculators, cell phones or anything else specified before the start of the exam.

Candidates who break these rules or copy any part of the exam will be disqualified.

The committee and the assisting personnel ensure that rules are observed and can take measures when they are not.

Art. 9- Enrolment

9.1 Ranking list and enrolment of place winners

The ranking list will be published on the University website, at the following page: www.unimi.it - Servizi online SIFA - Graduatorie ammissione corsi di laurea (http://www.unimi.it/hpsifa/nonProfiledPage_100.html) from 19 September 2017.

Publication of the ranking lists constitutes official notification to those concerned.

Based on the number of places available, place winners of the competitions must enrol online by midday, 25 September 2017, as indicated on the website http://www.unimi.it/studenti/matricole/77604.htm.

Not enrolling within the prescribed period the candidate will operate an implicit waiver and his place will become available for the following selections in accordance with the order of the ranking list.

9.2 First updating of ranking list

Places left vacant after the deadline for enrolment described in 9.1 are assigned to the next students in the ranking list and will be published on the website www.unimi.it - Servizi online SIFA - Graduatorie ammissione corsi di laurea (http://www.unimi.it/hpsifa/nonProfiledPage_100.html) as of 29 September 2017.

Applicants admitted for the places available must enrol by 12 noon on 4 October 2017, in accordance with the procedures published at http://www.unimi.it/studenti/matricole/77604.htm.

9.3 Second selection from the ranking list

Places left vacant after the deadline for enrolment described in 9.2 are assigned to the next students in the ranking list and will be published on the website www.unimi.it - Servizi online SIFA - Graduatorie ammissione corsi di laurea (http://www.unimi.it/hpsifa/nonProfiledPage_100.html) as of 9 October 2017.

Applicants admitted for the places available must enrol by 12 noon on 13 October 2017, in accordance with the procedures published at http://www.unimi.it/studenti/matricole/77604.htm.
9.4 Reassignment

If any places are still left vacant after expiry of the deadline for enrolment specified in 9.3, candidates will be selected by call on 23 October 2017. On this date, all interested candidates must appear at 10 am in the Aula Magna of the University of Milan - via Festa del Perdono 7, Milan. Candidates who do not appear will be considered to have withdrawn. Those who do not complete all the formalities of enrolment by the prescribed deadline will be deemed to have withdrawn.

9.5 Applicants with qualifications gained abroad

Applicants with qualifications gained abroad who enrolled online as indicated above must deliver the following documentation (show original and lodge photocopy) to the Ufficio studenti internazionali - Via Santa Sofia 9/1, Milan - by the deadlines indicated above:

- Upper secondary school diploma, translated into Italian, legalized by the authorities in the country where the qualification was issued and carrying a Dichiarazione di valore; or statement of validity issued by ENIC_NARIC centres or by diplomatic missions resident in Italy;
- Certificate of enrolment at university with a list of the exams taken, or certificate of post-secondary education obtained in a non-university higher education Institute if the local education system provides less than 12 years of schooling;
- Certificate of academic eligibility if provided for in the country of origin;
- Any other document stating specific requirements of validity of the title (e.g. Aps for the United States titles, A-level for British titles);
- Valid residence permit (only for non-EU citizens).

Verification of the validity of qualifications gained abroad is conducted on presentation of the official documents. Until then, applicants are admitted to the programme conditionally and may be excluded from the ranking list if they prove not to have the necessary qualifications.

Non-EU candidates resident abroad must sit for and pass the Italian language test organised by the University, as indicated at: http://www.unimi.it/studenti/foreign_students/23986.htm#c36777.

Art. 10 - Procedure Manager and contacts

Pursuant to law no. 241 of 7 August 1990 the manager of the procedure related to this announcement is Mr Giuseppe Boffi - Head of the Students Office for the Faculty of Medicine and Surgery - Schools of Specialisation).

For any further information regarding the content of the call please use the Infostudenti service (www.unimi.infostudente.it) by selecting the category: Test, bandi e graduatorie. Rep.Reg.2628/2017 of 12/07/2017

THE RECTOR

signed Gianluca Vago
Annex A:

Subjects covered in the admission exam for the second cycle degree programmes in Medicine and Surgery, in Dental Medicine, in Veterinary Medicine and in the first cycle degree programmes in the healthcare professions

For admission to the programmes, candidates are tested on general knowledge, especially literature, history, philosophy, sociology, institutions, comprehension and analysis of written texts of different types, and logical-mathematical reasoning. The knowledge and skills required are those taught in schools under programmes of the Ministry for Education for the final secondary school diploma, and include the scientific subjects of biology, chemistry, physics and mathematics.

**General Knowledge and Logical Reasoning**

The exam tests ability to use the Italian language correctly and to pursue an argument logically, coherently with the premises. It consists of multiple choice questions in symbolic or verbal form that may also be formulated with brief propositions. The candidate must exclude wrong, arbitrary and less probable conclusions.

The questions focus on scientific or literary texts by classical or contemporary authors, or on current affairs articles in newspapers, magazines or specialist journals. They also focus on cases or problems, which may be abstract and require different types of logical reasoning to solve.

Tests of general knowledge included in the school syllabus complete this section of the admission exam.

**Biology**

- The chemistry of living things
- The biological importance of weak interactions
- Organic molecules in living organisms and their respective functions. The role of enzymes.
- The cell as the basis of life
- Cell membrane: structure and function - membrane transport
- Cell structures and their specific functions
- Cell cycle and cell reproduction: mitosis and meiosis, chromosome complement and chromosome mapping
- Bioenergetics
- The energy currency of cells: ATP
- The processes of oxidation and reduction in living things
- Reproduction and Inheritance
- Life cycles. Sexual and asexual reproduction
- Mendelian genetics: laws and applications
- Classical genetics: chromosome theory of inheritance - models of inheritance

Human genetics: transmission of mono and multi-factorial traits, hereditary diseases with autosomal and X-linked transmission.

Biotechnology: recombinant DNA and its potential bio-technological applications.

Inheritance and environment.


Anatomy and physiology of animals and humans
Animal tissues
Anatomy of the major organs and their functions and interactions in humans

Chemistry

The constitution of matter: states of matter; heterogeneous and homogeneous systems; compounds and elements.
Ideal Gas Laws
Atomic structure: Elementary particles, atomic number and mass number, isotopes, electronic structure of atoms of the elements.
The periodic table of elements: Groups and periods, transition elements, periodic properties of elements: atomic radius, ionization potential, electron affinity, metals and non-metals; relations between electronic structure, position in the periodic table and properties.
Chemical bonds: ionic bonds, covalent and metallic bonds, bond energy, bond polarity, electronegativity, intermolecular bonds.
Fundamentals of inorganic chemistry: nomenclature and main properties of inorganic compounds: oxides, hydroxides, acids, salts.
Chemical reactions and stoichiometry: atomic and molecular weight, Avogadro constant, concept of mole and its applications, elementary stoichiometric calculations, types of chemical reactions.
Solutions: solvent properties of water, solubility, the main ways of expressing the concentration of solutions.
Equilibrium in aqueous solutions.
Elements of chemical kinetics and catalysis.
Oxidation and reduction: Oxidation number, the concepts of oxidising and reducing agents, balancing simple reactions.
Acids and bases: concepts of acid and base, acidity, neutrality and alkalinity of aqueous solutions, pH, buffers, hydrolysis.
Fundamentals of organic chemistry: bonds between carbon atoms; molecular, structural and displayed formulae; concept of isomers; aliphatic, alicyclic and aromatic hydrocarbons; functional groups: alcohols, ethers, amines, aldehydes, ketones, carboxylic acids, esters, amides. Elements of nomenclature.

Physics

Measures: direct and indirect measures, fundamental and derived quantities, physical dimensions of quantities, knowledge of the metric system and the CGS System of Units, Technical (or practical) (ST) and the International System (SI) of Units (names
and relationships between fundamental and derived units), and multiples and
submultiples (names and values).

- **Motion**: kinetic quantities, various types of motion with particular regard to uniform
  and uniformly accelerating rectilinear motion, uniform circular motion, harmonic
  motion (for all motion: definition and relationships between measures).

- **Dynamics**: vectors and operations with vectors. Forces, moment of a force about a
  point. Vector composition of forces. Definitions of mass and weight. Acceleration due
to gravity. Density and specific gravity. Law of universal gravitation, 1st, 2nd and 3rd
laws of motion. Work, kinetic energy, potential energy. Principle of conservation of

- **Fluid mechanics**: pressure and its units of measurement (not only in the SI system).
  Archimedes principle. Pascal’s principle. Stevino’s law.

- **Thermodynamics**: thermometry and calorimetry. Specific heat, heat capacity.
  First and second laws of thermodynamics.

- **Electrostatics and electrodynamics**: Coulomb’s law. Field and electric potential.
  Ohm’s law. Kirchhoff’s law. Electrical resistance and resistivity, electrical resistors in
  series and in parallel. Work, Power, Joule effect. Generators. Electromagnetic
  induction and alternating current. Effects of electrical currents (thermal, chemical
  and magnetic).

**Mathematics**

- **Algebra and numerical sets**: natural numbers, integers, rational and real numbers.
  Sorting and comparison, scales and scientific notation. Operations and their
  properties. Proportions and percentages. Powers with whole and rational exponents
  and their properties. Roots and their properties. Logarithms (base 10 and base e) and
  their properties. Elements of combinatorics. Algebraic and polynomial expressions.
  Special products of binomials, n-th power of a binomial, factorisation of polynomials.
  Algebraic fractions. Algebraic equations and inequalities of the first and second order.
  Systems of equations.

- **Functions**: basic concepts of functions and their graphical representations (domain,
codomain, sign, maxima and minima, increasing and decreasing, etc.). Elementary
  functions: whole and fractional algebraic functions, exponential, logarithmic and
  trigonometric functions. Composite functions and inverse functions. Trigonometric
  equations and inequalities.

- **Geometry**: polygons and their properties. Circle and circumference. Measurement
  of length, area and volume. Isometries, similarities and equivalences in the plane.
  Geometric loci. Measurement of angles in degrees and radians. Sine, cosine, tangent
  of an angle and their significant values. Trigonometric formulas. Solving triangles.
  Cartesian reference system in a plane. Distance between two points and the midpoint
  of a segment. Equation of a line. Concepts of parallel and perpendicular. Distance of
  a point from a straight line. Equation of the circle, parabola, hyperbola, ellipse and
  their representation in the Cartesian plane. Theorem of Pythagoras. First and second
  theorems of Euclid.

- **Probability and Statistics**: frequency distributions and their graphic representation.
  Concepts of random experiments and events. Probability and frequency.