1.1 School organization (after educational system reform in 1999)

- Population – 38.2 mln, 7 mln (aged 6–18) undergoing education
  0.5 mln of teachers

- **school education is compulsory** for children and youth aged 6 to 18.

- The Polish education system consists of:
  - primary school (lasts 6 years, pupils aged (7–13),
  - lower secondary school - *Gimnazjum* (lasts 3 years, ages 13–16),
  - upper secondary school - *Liceum* (3 years, ages 16–19)
  - vocational school – in Polish: *szkola zawodowa*,
  - college or / and university.

The general structure of the school system is shown in the Scheme 1.
Scheme 1.
The Polish education system
1.2 Curriculum

- Elements of environmental knowledge in grades 1-3rd of the Primary school, but start of “science” subject learning at the age of 10 being in the 4th grade.

- “Science” comprises the knowledge of four disciplines: Biology, Chemistry, Physics and Geography and is usually taught by biology or geography teacher, but very seldom by chemistry or physics teacher.

- Physics, Chemistry, Biology and Geography as the separate subjects are present in the school curricula in the 1st grade of the lower secondary school.

- At the lower secondary school stage all school subjects are compulsory for all pupils and the essential contents of them is consistent with the “Subject Cores”.

- The Subject Core Curriculum concerning all levels of education is an official document of the Polish Ministry of Education. Specification of standards is attached to this document. But we have many different curricula and textbooks based on these documents (e.g. 20 for physics).
• Before the higher secondary school, students are obliged to choose the type of school (general or vocational) - the course profile (e.g. in the general school: “mathematics-physics”, “biology-chemistry” and “linguistic” course or in the vocational school - any vocational profile).

• At this educational stage there are two levels of teaching – the basic level, which is obligatory for all students and for some subject chosen to be taught – the extended (advanced) level, but this level is not compulsory.

• The basic and extended level curricula of particular subjects should prepare graduates to the basic or extended Matura exam (a national secondary school - leaving exam) of the subject.

• The number of teaching hours (45-minute periods) per week devoted to particular Science subjects in Polish school curriculum is listed in the table below (Table 1.).
Table 1. The number of h/week devoted to particular Science subjects

<table>
<thead>
<tr>
<th>The type of the school</th>
<th>Subject</th>
<th>Number of lessons per week/No. of hours during all the course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary school</td>
<td>Science</td>
<td>3 / 9</td>
</tr>
<tr>
<td>Lower Secondary School</td>
<td>Physics</td>
<td>1 or 2 / 4</td>
</tr>
<tr>
<td></td>
<td>Chemistry</td>
<td>1 or 2 / 4</td>
</tr>
<tr>
<td></td>
<td>Biology</td>
<td>1 or 2 / 4</td>
</tr>
<tr>
<td></td>
<td>Geography</td>
<td>1 or 2 / 4</td>
</tr>
<tr>
<td>Upper secondary school</td>
<td>Physics</td>
<td>1 or 2 / 3</td>
</tr>
<tr>
<td>(Basic level)</td>
<td>Chemistry</td>
<td>1 or 2 / 3</td>
</tr>
<tr>
<td></td>
<td>Biology</td>
<td>1 or 2 / 3</td>
</tr>
<tr>
<td>Upper secondary school</td>
<td>Physics</td>
<td>1 or 2 / up to 5</td>
</tr>
<tr>
<td>(min No. of hours for the extended level)</td>
<td>Chemistry</td>
<td>1 or 2 / up to 5</td>
</tr>
<tr>
<td></td>
<td>Biology</td>
<td>1 or 2 / up to 5</td>
</tr>
</tbody>
</table>

Recently all Science Core Curricula has been revised by the Institute of Public Affairs, but they are still not approved by the new Minister of Education.
1.3 Assessment

- Since 2002 after the Primary school, the pupils have been given *Competence test*.

- After the lower secondary school - *Reference test* is compulsory. The Reference test is aimed at the assessment of pupils’ knowledge concerned with all together - Science and Mathematics.

- The Polish *Matura* examination (an upper secondary school - leaving exam) consists of compulsory *written and oral parts within the three subjects*: Polish language and literature, Foreign language (modern) and *one more subject from the list* containing almost all the school subjects (Mathematics, Physics and Astronomy, Biology, etc.).

- In the *school year 2007*, only 5% of students have chosen Physics and 20% Mathematics. Students may choose also the level of their examination (excluding Polish language and literature): either basic or the extended one.
• The *Matura* examination, totally external is conducted by the recently established institutions, i.e. the *Central Examination Commission and 8 Regional Examination Commissions.*

• For the majority of Polish higher education institutions (universities or colleges) the *Matura* certificate is sufficient to gain access to the adequate *Faculty* and to take a selected subject course.

• But, as far as Science Faculties are concerned, there is only sufficient number of students willing to study Biology subject, but recently the number of candidates for Chemistry and Physics subject is starting to decrease.
2.1 Science teacher training

*Science teachers at the upper secondary schools*

The system at the level of tertiary education (according to Bologna process) is similar to the models existing in many European countries.

School teachers for *the upper secondary school* are trained at the universities and other type of the higher education institutions, such as pedagogical academies, which last 5 years and follows Master-degree studies.

The Subject Core of the pedagogical courses and studies curricula for future teachers were elaborated recently (2004) by the Ministry of Education.

This document consists of the requirements for the subject and pedagogical knowledge as well as for the foreign languages and ICT skills.

This facultative Pedagogical course was (until academic year 2006/2007) obligatory only for those students who decided to obtain teaching qualifications in both types of secondary schools.
**Scheme 2. The content of the facultative Pedagogical Course for pre-service Physics teacher training at the NCU in Torun**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>School practice</td>
<td>30%</td>
</tr>
<tr>
<td>General pedagogical subjects</td>
<td>43%</td>
</tr>
<tr>
<td>Educational physics</td>
<td>27%</td>
</tr>
</tbody>
</table>

**Two-subject Science teachers for lower secondary school**

The education of a **lower secondary two-subject school teacher** (which is obligatory model of teacher training in Poland since 2004) **lasts three years**.

In the Faculty of Physics, Astronomy and Applied Informatics the trainee teachers could choose two specializations of the studies: **Physics and Computer Science and Physics and Mathematics**.
2.2 Science teacher organisation

The most of Polish secondary schools have separate Biology, Physics, Chemistry and Geography departments.

However, science teachers are discussing much more about interdisciplinary approach to science teaching since the year 1993, when the Polish Association of Science Teachers was created. (http://psnpp.org.pl)

Now they have also possibility to publish their professional achievements in the Polish Journal “Science Education”.

![Polish Journal “Science Education”](image)
2.4 Science teacher qualifications

The Education Information System at the web page of our Ministry of Education was established in 2005, and there is not enough data to answer all interesting questions.

But, I have to say, that after the 1989 aspirations of Polish society as well as teachers are growing. The number of people possessing an University diploma have increases by 52% and actually about 10% of population have finished advanced University studies.

The science teachers are also improving their professional qualifications taking a part in different types of In-service and Postgraduate science courses, obtaining diploma (e.g in the school year 2003/2004 15% of teachers attended such courses.)
3. Science as a practical activity and science teacher pedagogy

As we introduced “science” as an elementary school subject quite recently, we are still developing the methods and tools of teaching science.

We are recommending mostly “investigative science” and environmental education (e.g. the book for science teachers “Teaching science” has been edited in 2005 and subject Conferences are often organised),

But we are not sure how the practice looks like. In the opinion of Polish secondary schools teachers the number of science lessons is too small to use the experimental potential of science disciplines.
4. Current issues

In September 2005 Ministry of Education published the document: “Education and competencies” – National Plan of Development for 2007-2013, in which some strong and weak factors of our education system were pointed out.

Strong points are e.g.:

- compulsory schooling up to 18,
- differentiated structure of education system,
- high percent of educated people (250 higher education institution),
- large offer of school curricula and textbooks,
- system of financial help for students,
- high school autonomy,
- establishment of “Education Information System”,
- increased number of computers at schools,
- possibility to use the financial grants from EU.
But weak points are e.g.:

- low achievements of pupils in PISA investigations,
- too low number of IT and Foreign language teachers,
- too low number of science and mathematics students finishing higher education,
- not enough developed system of “long life” and distance learning,
- very low outlay for one pupil/University student,
- slow development of scientific carriers,
- very high unemployment, etc.

I am aware, that this list is incomplete and I would like to recommend:

- the improvement of science teaching standards and the exams form,
- promotion of science and science education,
- recognition of the scientific disciplines “science” and “education of science” and supporting research on the quality of school science education.
If you think that education is not important or too expensive you didn’t try ignorance.