

# Organization of education in meteorology and climatology in Ukraine

S. Stepanenko

Dept. of Physics Atmosphere & Ocean, Odessa State Environmental University, Ukraine,  
(rector@ogmi.farlep.odessa.ua / Fax: +380-482-4277-67)

The Ukraine enjoys a wide experience of training specialists in the field of Meteorology and Climatology. As long ago as in 1912 the first meteorology examiner courses were conducted at the Novorossiisk (presently, the Odessa) and Kiev State Universities for the quickly developing network of meteorological observation in the south of the former Russian Empire. In 1932 the Kharkov (presently, the Odessa) Hydrometeorological Institute aimed at training engineers with a university level of training (Bachelor, Master of Science) in the field of Meteorology and Operational Hydrology was established. Later, the Kharkov and the Kherson Hydrometeorological Technical Colleges, having a lower level of training in the field of basic disciplines but more efficient specialist education, were organized.

Such structure of education was in complete correspondence with the requirements of the Soviet system of Higher and Specialized Secondary Education and provided the acknowledged throughout the world high standards of both theoretical and practical training of meteorologists and climatologists. Thousands of specialists of I to III class (in accordance with the former WMO classification) for the former USSR and about 100 other countries, including the Program of Voluntary Cooperation by the WMO, were trained till 1992. The system had certain drawbacks among which the lack of coordination and consistency in the training of specialists of various degrees is worth special mentioning.

In 1992 the Ukraine began to achieve a gradual transition towards a new system of Higher Education, which presupposes:

1. a three-level system of education and training:
  - (a) Assistant Specialist (Technician),
  - (b) Bachelor,
  - (c) Engineer, Master
2. continuity, in the sense that the training syllabi are sequentially built one around the other (a, so to say, set-of-nested-Russian-dolls principle) and comprise one sequence.

Now, in frame of Bologna process, about 78 separate leads of education and training were set up with such an aim and the unified start-to-finish syllabi for Assistant Specialist to Engineer (Master) levels are being drawn. A special lead of training – «Hydrometeorology» was selected in the Ukraine among these ones and a considerable reorganisation of the meteorological education and training structure has taken place. The united center of study – The Ukrainian Center of Hydrometeorological Education and Training was established on the basis of the Odessa Hydrometeorological Institute (college of Odessa State Environmental University) and two technical colleges. A concept of continuing study and training of specialists of I to III classes (in accordance with the former WMO classification for meteorologists) is being implemented within its framework.

Integrated training syllabi, which make it possible for a student to move up by request and, at the same time, carry out a substantial cost cutting on level I specialist training, have been worked out with such an aim.

The general principle for drawing up of such syllabi is a modular one, embracing three units of training:

1. a two-year compulsory general training (72 weeks of instruction)
2. a two-year professional training within the limits of the chosen specialization (74 weeks of instruction)
3. a one-year special or advanced training within the limits of the chosen specialization (40 weeks of instruction).

The first two modules comprise the Bachelor of Science (Hydrometeorology) syllabus. The first one is also a compound of the Assistant Specialist (Technician) in Hydrometeorology one (the rest of it being an advanced practical training).

The first unit (module) includes disciplines providing a study of the basic disciplines (50% of the instruction period), the humanities (20% of the instruction period), the grounding (knowledge and skills) of Hydrometeorology (30% of the instruction period).

The study of the basic disciplines embraces the cycle of Physics and Mathematics - 25%, and the one of Natural Science (Chemistry, Geophysics, Land Surveying, Hydrodynamics, Electronics, Digital Equipment, Computer Training) – 25%

The Grounding of “Hydrometeorology” involves training in the following disciplines:

1. Physics of the Atmosphere;

2. The Fundamentals of Hydrology;
3. The Fundamentals of Oceanography;
4. The Fundamentals of Climatology;
5. Methods of Hydrometeorological Observation;
6. Methods of Hydrometeorological Information Processing and Analysis ;
7. Summer on-the-job training in the above-mentioned disciplines.

The distinctive features of the two-year professional training (second) module are:

1. basic theoretical and practical training in a chosen specialty along with attainments in marketing of hydrometeorological product. Within the framework of the lead of Hydrometeorology the following specialities were designated:
  - (a) Meteorology,
  - (b) Climatology,
  - (c) Agriculture meteorology,
  - (d) Hydrology,
  - (e) Oceanography,
  - (f) Hydrography.

The list of basic specialized disciplines in ‘Meteorology’ and ‘Climatology’ is given below:

1. Meteorology:
  - (a) Dynamic Meteorology,
  - (b) Synoptic Meteorology.
  - (c) Mesometeorology,
  - (d) Hydrodynamic Methods of Weather Forecasting,
  - (e) Multidimensional Statistic Analysis of Meteorological Fields
2. Climatology:
  - (a) Applied Climatology,

- (b) Multidimensional Statistic Analysis of Climatologic Data and Fields,
  - (c) Theory of Climate Changes,
  - (d) General Atmospheric Circulation.
3. a division of a student stream at the closing stage (the second year of the module) into those who, within the limits of the third module, would be provided training as specialists in applied aspects (engineers), and the ones of advanced theoretical education.

The final (third) module presupposes specialized training in chosen specialties – more than 15 various specializations – with an accent on practical training (Engineers) and scientific (or administer) study (Masters). The syllabi of this module are quite flexible to meet a customer's demands, the National Hydrometeorological Service, the Ministry of Environment, the Ministry of Agriculture, the Ministry of Defense, the State Committee for Water Management being among the principal ones.

A total of more than 30 education and training programs were drawn up to implement the training of specialists of III to I class in various specializations. The modular unit structure of syllabi made it possible, firstly, to maintain the best distinctive features and peculiarities of the Soviet system of training which combined a thorough theoretical study with extensive practical training of hydrometeorologists and, secondly, set up the system of continuing training, enabling a student to sequentially move up and determine on a syllabus of training on his own, and, thirdly, shorten the period and, consequently, avoid extra expenses of successive training of specialists. For example, the period of training of an engineer comprised 8 years (including the training at a technical college), now it is only a 6-year one.

In accordance with the concept of continuing training for those who have successfully completed the previous course, there suggested two possible ways of further education: one can

- 1. be provided regular or non-working-hours higher level education;
- 2. receive instruction (at least once in five years) of short-term syllabi (up to 1 month) aimed at the development of vocational competence.

With such an aim more than 20 training and development programs for specialists of the National Hydrometeorological Service operational units, other ministries and departments have been developed and put into practice by the Center.

Scientific research and teaching staff for the corresponding units of the National Service on the basis of the Candidate and Doctorate programs have also been trained.

Thereby, a model of a Study Center, which makes it possible to see the concept of continuing education of specialists in the field of Meteorology and Operational Hydrology in the Ukraine fulfilled, has been built up.

As the new standards and programs for hydrometeorological education in the Ukraine have been worked out, there arise a problem of comparability (compatibility) of national programs of training.