

Organization of optical education
in conditions of typical university

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ABSTRACT

Organization of optical education in the typical university of Russia is reported. Fundamental training is carried out according to the typical curricula. Special training includes student's research work suggested by industrial enterprises and research centres. A centre of continuing education in training specialists functions at the university. The centre is responsible for continuing education in pre-school establishments, secondary schools, lyceums, high schools, the university and the refresher course.

2. INTRODUCTION

Kemerovo State University is situated in one of the largest industrial regions of Russia-Kuzbas. The university offers a wide range of specialities, the training being carried out according to typical curricula adopted in the system of public education in this country.

As a rule, a preference is being given to a particular scientific trend that requires highly qualified academic staff and modern equipment. The scientific and technological potential is designed for training specialists in a particular field.

Moscow physical-technical Institute, Leningrad institute of fine mechanics and optics lead in training specialists in optics both in volume and qualification but at the same time non-special faculties of some higher schools train just a few specialists("the training of individuals").

The training of specialists and intensified optical teaching in this case depends on university resources on the one hand and on industrial, educational and scientific demand of the region - on the other.

A rapid growth of mining, metallurgy and chemistry in Kuzbas in the 50th needed many specialists in the fields of physico-chemical methods of analysis and material investigation which brought about the research in emission, molecular and (optical, in particular) spectroscopy. The scientific school in

spectroscopy was engaged in this activity. Well-known scientists of Leningrad university, Institute of Physics of the USSR Academy of Sciences, Siberian department of the USSR Academy of Sciences and others contributed much to it.

3. OPTICAL EDUCATION

That is why the Kemerovo Pedagogical institute which became the university in 1974 began to train specialists in optics and spectroscopy in the physics faculty. Optical training includes a course of general physics and some specialized courses in optics and spectroscopy, solid state physics (semiconductors and dielectrics), theoretical physics enabling us to train specialists in a particular field. The choice of this or that specialized course is accounted for by industrial needs and demands. The curriculum of these courses affords 400 credit hours: 50% - for lectures and 25% - for seminars and laboratory sessions each. Some 300-350 additional hours can be afforded for training specialists for industry. Then a graduate would be awarded the degree of "Physicist" but not "Teacher of physics". A list of all studied subjects would be given in the appendix to a diploma.

The following are the main scientific trends in the optical training of specialists:

- condensed system spectroscopy;
- optical stimulation of chemical reactions;
- application of optical methods in ecology.

This is ensured by the modernized equipment and highly qualified teachers at the university. Students specializing in the field mentioned are offered the following courses: theoretical optics, the effect of radiation on materials, optical spectroscopy techniques, laser spectroscopy, optoelectronics, computers in physico-chemical research, etc.

Special teaching of the students involves an independent research work as a key element. After a student has completed his fundamental education he chooses a subject for his research in his 5th-6th terms and consequently, specialized courses are related to the subject of his research. He completes his studies by submitting a graduation paper. More than 80% students are trained according to such a scheme. The scheme appears to be most effective when the subject of student's research is suggested by industrial enterprises or research centres and finds its practical application there.

4. A CENTRE OF CONTINUING EDUCATION

It may be interesting to mention the role of the centre of

continuing education in training specialists. The centre is responsible for continuing education of 25 thousand people in pre-school establishments, secondary schools, 2 Lyceums, 3 high schools, the university and the refresher course. All the faculties are involved in the activity of the centre. The faculty of physics is concerned with optical education at all levels: a secondary school, a higher school, a post-graduate course.

For a secondary school the system of continuing education provides for:

- correction of school curricula, offering help in equipping school labs, provision with teacher's staff;
- organizing individual classes for apt pupils;
- training applicants for the faculty of physics at the university.

At the university it provides for:

- teaching general physics resulting in qualification exam and recommendations as to their future speciality;
- teaching special subjects: "Optics and spectroscopy", "Physics of dielectrics and semiconductors" (30% - optical properties of solids), "Theoretical physics" (30% - theory of optical properties of crystals);
- training teachers of physics with the emphasis on fundamental optical education (laboratories of physical optics, non-linear optics, emission analysis, molecular spectroscopy, etc);
- participating in research of Research Laboratory of Spectroscopy of Solids at the university;

For the post-graduate course it provides for speciality O.1.04.07 - solid state physics (optical properties of solids - 50%).

About 50% of theses on the problems of optics using optico-spectroscopic techniques to study condensed media are submitted for defence to the Regional Specialized Council at the university.

Specialists in optics are assigned to work at higher schools, research institutes, in the labs of chemical plants, schools, Lyceums. Students have their practical training at factories. Besides, their course papers and graduation papers are prepared there too.

More than 500 specialists working in various branches of science and industry have been trained by the faculty up to now. More than twenty of them have been awarded the degree of Cand. Sc. (Physics).