Curriculum Vitae

Name: Yuriy Drozd, Professor, Doctor of Sciences,
the State Prize of Ukraine Laureate (2007)

Degrees:

Diploma in Mathematics:	Kiev Taras Shevchenko University	1966
Candidate of Science (Ph.D.):	Steklov Mathematical Institute, Moscow	1970
Doctor of Science:	Leningrad State University	1981

Positions held:

Professor:	Kiev Taras Shevchenko University Department of Mathematics	1980–now
Docent (Lecturer):	Kiev Taras Shevchenko University Department of Mathematics	1973–1980
Senior Instructor:	Kiev Taras Shevchenko University Department of Mathematics	1971–1973
Instructor:	Kiev Taras Shevchenko University, Department of Mathematics	1969–1971
Research Candidate:	Ukrainian Academy of Science Institute of Mathematics	1966–1969
Visiting Professor:	Uppsala University	September 2004 – December 2004
Visiting Professor:	Universität Kaiserslautern	October 2001 – September 2002
Research Fellow:	Max-Plank-Institut für Mathematik	September 1999 – August 2000
Visiting Professor:	Université Louis Pasteur, Strasbourg	February – June 1999
Visiting Professor:	Universität Kaiserslautern	October 1998 – February 1999
Visiting Professor:	Université Louis Pasteur, Strasbourg	February – June 1998
Visiting Professor:	University of California at Santa Barbara	April – June 1997

Scholarly and professional activity:

Vice-Chair for Scientific Research, Department of Mathematics, Kiev Taras Shevchenko University, 1973–1980.

Chair of Working Group in Representation Theory, 1978–now

Chair of Division of Algebra and Mathematical Logic, Kiev Taras Shevchenko University, 1980–1998.

Chair of Kiev Algebraic Seminar, 1981–now

Chair of Teaching Committee, Department of Mathematics, Kiev Taras Shevchenko University, 1987–1997.

Member of Advisory Committee of International Conferences on Representation of Algebras (ICRA), 1991–now.

Chairman of Organizing Committee of International Conference "Representation Theory and Computer Algebra," 1997.

Editorial Board member of the journal "Algebras and Representation Theory" Kluwer Academic Publishers, since 1997 (Editor-in-Chief 1997–2002).

Editor of the journal "Algebra and Discrete Mathematics," since 2002.

Editorial Board member of the "Central European Journal of Mathematics," since 2003.

Chairman of the Program Committee of the 4th International Algebraic Conference in Ukraine, 2003.

Research experience:

My research activity has been concentrated mainly in the representation theory of groups and algebras. My first achievements were in the field of integral representations of orders. Namely, I gave a criterion for a cubic order being of finite representation type (cf. [73] in the list of research articles); then, in cooperation with A. Roiter, I spread this criterion to all commutative orders [72], together with the complete list of indecomposable representations for the orders of finite type. Further, in cooperation with V. Kirichenko, I gave a classification of the so called Bassian orders [69], proved a reduction theorem for a wider class of quasi-Bassian orders [62] and, using these results, obtained a criterion for any primary order being of finite representations type [58]. At the same time, I developed the applications of the idéles technique for study of genera of integral representations [65], in particular, proved the analogues of the theorems on the distribution of prime ideals for the distribution of maximal submodules in a genus [66].

In the next period I mainly studied the classification problems of linear algebra in connection with the representation theory of finite dimensional algebras. I gave a general framework for studying such classification problems in terms of the categories of matrices [60], widely used till now. I also generalized the theorem of Gabriel–Bernstein–Gelfand–Ponomarev on representations of quivers for representations of partially ordered sets [55] and gave an interpretation of these representations in terms of representations of a special class of orders [54]. At the same time I considered a distinction between two classes of classification problems, further called "tame" and "wild" ones, and gave the first example showing, for representations of commutative algebras, any problem is either tame or wild [61]. Later on, I proved this result for the general case of "representations of boxes," in particular, for categories of matrices and for representations of any finite di-

mensional algebras [48,44]. In cooperation with V. Bondarenko, I also gave an explicit criterion for a modular group algebra to be tame (or wild) [47].

I was also working in the general theory of rings and modules, in particular, in the theory of commutative rings and of classical orders. Here I gave structure theorems for hereditary rings and modules over them [42,43], for serial rings [51,53], for locally conjugate orders [45], for the semi-group of ideals of commutative noetherian rings [46,49]. I also gave necessary and sufficient conditions for the existence of maximal orders in an algebra [38] and started a common study of lattices over the orders of arbitrary Krull dimension (in cooperation with L. Chernova) [30,36].

At about this time, I organized in Kiev University a working group on representation theory, which consisted mainly of young mathematicians (partially, my graduate students). The aim of it was to unify the people working in "non-classical" areas of representation theory, such as integral representations, representations of non-semi-simple algebras, etc., and to spread our activity to new areas, where our methods could be used.

Further, I started a study of representations of Lie algebras and Lie groups. It was a new topic for Kiev University, so I tried to organize a group of younger researchers working in this area. First, I studies weight representations of Lie algebra $\mathrm{sl}(2)$, in particular, gave a classification of the restricted representations over a field of positive characteristic [40]. Later, I was working in this area mainly in cooperation with V. Futorny and S. Ovsienko. We introduced a new class of representations of Lie algebras $\mathrm{sl}(n)$, the so called "Gelfand–Zetlin modules," and proved structure theorems for them [20,25,28,33]. We also generalized the known Harish-Chandra homomorphism and used it to obtain information about generalized Verma modules [29]. At the same time I used the technique of classification problems of linear algebra to study representations of "mixed" Lie groups (i.e., neither reductive, nor solvable) and described a wide class of representations (those of "general position") for linear groups over Dynkin algebras [27].

Starting from 1991, I also returned to my activity related to integral representations, or, more precise, to the theory of Cohen-Macaulay modules, mainly, in Krull dimension 1. That was done in collaboration with G.-M. Greuel. First, we spread to this situation the "tame–wild" dichotomy [24]. Then we studied Cohen-Macaulay modules over local rings of singular curves, gave an explicit criterion for their classification to be tame (or wild) and recovered the relations with the classification of plane curve singularities, namely, with unimodal singularities [9,10,15,22]. We also constructed versal families (with projective bases) of Cohen–Macaulay modules of prescribed rank and used them to prove a semi-continuity theorem for the number of parameters defining such modules [13]. To consider Cohen-Macaulay algebras of Krull dimension 2, we had to classify vector bundles over projective curves. We proved that such a classification is always either of finite type, or tame, or wild (in the same sense as in the theory of finite

dimensional algebras) and gave a complete description of curves of finite and tame types, as well as of all vector bundles over such curves [4,6]. Using this criterion, we proved that among minimal elliptic surface singularities, only simple elliptic and cusp singularities are tame with respect to the classification of Cohen–Macaulay modules [1,6]. Further, in collaboration with my student I. Burban on I applied this technique to study derived categories of modules and coherent sheaves. Especially, we got a complete description of derived categories of coherent sheaves over singular curves of finite and tame vector bundle types. We also introduced a new class of rings that are non-commutative analogues of locale rings of simple double points and described derived categories of modules over such rings [?].

At last, I have started, in collaboration with H. Baues, to apply the developed methods to the classification problems of homotopy types of polyhedra. We gave a classification of stable homotopy types of the $(n-1)$-connected polyhedra with torsion free homology of dimension $n+d$ for $d=4,5$ and proved that, for $d>5$, there is infinitely many stable homotopy classes of such polyhedra [7,8]. We also studied homotopy types of polyhedra having at most two non-trivial homotopy groups [3]. In this connection I also studied polynomial functors playing important role in homotopy theory. I gave a complete description of quadratic functors [?] and of several classes of cubic functors [?] and proved that a complete classifiaction fo cubic functors is a wild problem [?].

During this time I supervised 23 Ph. D. Theses, (see the list below), published 5 books and 88 research articles. In 1997, in cooperation with A. Verschoren I organized an international journal "Algebras and Representation Theory" published by Kluwer Academic Publishers. I am a member of the Advisory Committee of ICRA (International Conference on Representations of Algebras) since 1991. In 1997 I was the Chair of the Organizing Committee of the international conference "Representation Theory and Computer Algebra." Since 1992, I received several grants both from the Ukrainian and from international organization (cf. the list below).

Teaching experience:

I have been teaching undergraduate and graduate mathematics at Kiev Taras Shevchenko University from 1969 till now. During this period I taught more than 20 different courses (the list of courses taught since 1980 see below). In 1980–1998 I was the Chair of Division of Algebra and Mathematical Logic, where I implemented several new (for Kiev University) courses such as Algebraic Geometry, Categorical Methods in Representation Theory, Singularities and Catastrophes, etc. I was also the Chair of the Teaching Committee of the Department of Mechanics and Mathematics in 1987–1997. During this period I elaborated a new program of studying mathematics at the department both on the bachelor and at the master level. This program is still in use at Kiev University and has been recommended by the

Ukrainian Ministry of Education for the opther Universities.

I have also been supervising the Diploma works (analogue of MS Thesis, usually 3–5 students pro year) as well as of research seminars for the students beginning their independent scientific activity.

In 1997 I was Visiting Professor at the University of California in Santa Barbara, teaching linear algebra for undergraduate students. The references can be obtained from John Doner, Vice-Chair.

In 1998 and 1999 I was Visiting Professor at the University of Strasbourg (France), teaching the courses of Geometry (including affine and Euclidean geometry) and of Real Analysis. The references can be obtained from Patrick Foulon, Director of IRMA.

In 1998/99 I was Visiting professor at Kaiserslautern University (Germany), where I was teaching Algebraic Geometry for the graduate students of the special program "Mathematics International" (in English) and supervising MS Theses of several students (mainly those coming from Kiev University). In 2001/02 I am again Visiting professor at Kaiserslautern University, where I am teaching two courses: Commutative Algehbra and special course on Algebraic Geometry and Representation Theory. The references can be obtained from Gert-Martin Greuel, Professor, Prodekan.

Courses taught since 1980:
Linear Algebra
Algebra and Number Theory
Geometry (affine and Euclidean)
Mathematical Logic
History of Mathematics
Discrete Mathematics
Real Analysis
Introduction to Modern Algebra
Theory of Algebraic Numbers
Algebraic Geometry
Algebraic Topology
Commutative Algebra
Representations Theory and Algebraic Geometry
Galois Theory of Algebraic and Differential Equations
Homological Algebra
Representations of Algebras
Categories in Representation Theory
Lie Groups and Lie Algebras
Representations of Lie Algebras
Representations of Groups
Theory of Singularities and Catastrophes
Numerical Methods of Linear Algebra

Supervision of Ph.D. Theses:

1976	Roganov Yu.V.	Homological dimension of tensor algebras
1979	Sakalosh S.	Projective modules over tensor algebras
1980	Turchin V.M.	On locally conjugate orders
1983	Grigorenko N.S.	On Picard-Vessiot theory of linear differential equations
1986	Futorny V.M.	Weight modules over semi-simple Lie algebras
1987	Furchin B.Yu.	Coverings of boxes and algebras
1988	Beckert V.I.	Representations of quivers with relations
1989	Lie Sun Ghen	Representations of Lie groups of step matrices
1989	Faisov S.K.	Categories of free ideals
1990	Noumi G.A.	Maximal orders in Lie algebras
1990	Hallouf Ya.	Twisted Lie algebras and their representations
1991	Golovashchuk N.S.	Coverings of certain class of matrix problems
1991	Zeldich M.V.	On classification of sincere weakly positive quadratic forms
1992	Bavula V.	Homological properties of representations of Lie algebras
1992	Timoshin A.S.	Representations of net subgroups and their generalizations
1993	Hon Sen Ghu	Whittaker modules over generalized Weyl algebras
1993	Abbas A.A.S.	Representations of some unipotent Lie groups
1994	Chernova L.F.	Lattices over Noetherian algebras
1994	Muthana A.M.	On classification of torsion-free modules
1995	Khibina M.A.	Structure of semi-distributive rings
1996	Izyumchenko L.V.	Modules over hereditary rings
1997	Mazorchuk V.S.	Structure of generalized Verma modules
2003	Burban I.	Derived categories of coherent sheaves over algebraic curves
2005	Levandovski V.	Gröbner basis and related algorithms for non-commutative algebras
2006	Kubichka E.	Modalities of representations of partially ordered sets
2007	Bodnarchuk L.	Stable vector bundles over singular curves
(in progress)	Bondarenko V.	Matrix problems in the theory of groups and Cohen–Macaulay modules
(in progress)	Kolomiets P.	On a generalization of Schubert varieties

Recent Grants and Awards:

Ministry of Education Award for developing the new academic plans in speciality "Mathematics" for the Universities (1994) 1,000,000 Kupons

Foundation for Fundamental Research of Ukraine Grants to work in

representation theory of algebras:

1/520 (1992–93) 5,500,000 Kupons
1(1)3/50 (1994–96) 440,000,000 Kupons
1.4/76 (1997–99) 10,316 Hrivnas

Grant of Volkswagen-Stiftung for cooperation Kiev–Bielefeld Universities (with C. Ringel): (1993–95) DM 60,000

International Science Foundation Grants:

RKJ000 (1994–95) US $ 26,000
RKJ100/200 (1996) US $ 10,400

INTAS Grants (Ukrainian part):

for representation theory: 93-0183 (1995–97) ECU 6,500
for algebraic geometry: 93-2805 (1995–97) ECU 4,200

Grant CRDF (FSU part): UM1-327 (1997–99) US $ 37,800
Grant CRDF (FSU part): UM2-2094 (2000–01) US $ 41,800

Award of ISSEP "Soros Professorship": (1997) US $ 3,600