

Predictive Microbiology for Food Safety

Overview: Today, in the world of modernization with changing lifestyles, people eat food without knowing its nutritional or toxic value. Presently, food safety is an important issue to be considered in order to guard against the potentially serious health hazards. Various pathogenic microorganisms can be transmitted from person-to-person by food as a vehicle of transmission and can cause deadly diseases. There are many reports of food poisoning outbreaks around the globe, leading to high mortality rates. This serious issue needs to be monitored and controlled by studying the microorganisms responsible for food contamination. Also, the quality of food can be improved, if the metabolism of various microorganisms, which are beneficial for human health are studied.

This course will provide attendees with an excellent opportunity to learn the most important microbiological safety issues facing the food industry on a global scale; it will enhance and update knowledge of predictive microbiology; and attendees will learn new approaches for modeling foodborne pathogens. Furthermore, this workshop supports our mission to provide consumers with microbiologically safe foods in domestic markets and safe foods for export. The overall goal of the proposed course is to provide a clear understanding of how to use the microbial modeling software to obtain accurate estimates on growth, survival and the lethal effects of processing environments on foodborne pathogens and how to formulate foods to include acknowledged intrinsic barriers while designing intervention processes that ensure safety against pathogens in foods. The intended audience for this course will include: undergraduate and graduate students in Food Technology, Microbiology, Biochemistry and Biotechnology who have an interest in food safety predictive microbiology, regulatory agencies food inspectors, food industry professionals responsible for product development and Hazard Analysis Critical Control Point (HACCP) validation, and quality assurance professionals. Professionals will use the knowledge obtained in developing experimental designs, pertaining to the number of samples to be prepared and determining the interval between sampling, based on the predictions from the modeling program

Modules	<p style="text-align: center;">Predictive Microbiology for Food Safety: 19-09-2016 to 23-09-2016 The number of participants for the course will be limited to 50.</p> <ol style="list-style-type: none"> 1. September 19, 2016: Workshop introduction/General view: Predictive Microbiology for Food Safety. Issues related to food safety and the upcoming challenges related to food safety in the 21st century. 2. September 20, 2016: <ul style="list-style-type: none"> • Various pathogens responsible for food borne diseases and food products of concern • Existing and emerging technologies for food preservation. • Food formulation and processing guidelines 3. September, 21, 2016: <ul style="list-style-type: none"> • Comprehensive Intervention strategies for pathogen control in foods - hurdle concept • Fundamentals of predictive microbiology • Experimental design and data collection 4. September 22, 2016: <p>Primary models: To describe the microbial population with time (fitting curves to data) - growth, survival, and inactivation curves; measuring parameter values - Gompertz, Baranyi, Weibull, D values</p> <p>Secondary models: To describe changes in parameter values of primary model with changes in environmental conditions (Temp, pH, a_w, preservatives, etc.) - square root growth and regression equations</p> <p>Tertiary models (model interface): software tools to input data, predict results, e.g., Pathogen Modeling Program (USDA)</p> 8. September 23, 2016: <ul style="list-style-type: none"> • Overview and demonstration of software tools • Regulatory perspective on the use of predictive microbiology • Case studies demonstrating their application • Hands-on demonstrations and training for proper use of the programs; all participants will be provided with a laptop <p>Close workshop: Evaluation sheet will be provided to obtain feedback from attendees</p>
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This workshop will describe and demonstrate how the current computer programs of the U.S. Department of Agriculture, Agricultural Research Service can be used to predict behavior of the pathogens in foods. The programs include: 1) Predictive Microbiology Information Portal (**PMIP**); 2) Pathogen Modeling Program (**PMP**); and 3) **ComBase**. By participating in this workshop, attendees will better understand how to use these programs to enhance the safety of food. All participants will be provided with a laptop to obtain hands-on experience on the use of the software programs. A description of the programs to be covered in the workshop are as follows:

PMIP is geared to assist food companies (large and small) in the use of predictive models, the appropriate application of models, and proper model interpretation. The PMIP links users to numerous and diverse resources associated with models (PMP), databases (ComBase), regulatory requirements, and food safety principles.

PMP, the desktop version, is a package of models that can be used to predict the growth and inactivation of foodborne bacteria, primarily pathogens, under various environmental conditions. These predictions are specific to certain bacterial strains and specific environments (e.g., culture media, food, etc.) that were used to generate the models.

ComBase is a database that contains information about how microorganisms respond to different environments. Using an internet interface, the user identifies criteria that are relevant to a specific food microbiology scenario. This may include identifying a specific microorganism, type of food, level of acidity, temperature, water activity, and the presence of specific food conditions, such as additives, preparation methods and packaging atmospheres. After searching the database for the desired information, the results can be downloaded and used for model development or validation.

<p>You should attend if:</p>	<ul style="list-style-type: none"> • You are a student (MSc/MTech/PhD) of different subject areas including Food Technology, Microbiology, Biochemistry and Biotechnology • Faculty from reputed academic institutions and technical institutions • Researchers from manufacturing, service and government organizations including R&D laboratories
<p>Fees:</p>	<ul style="list-style-type: none"> • Participants from abroad: US \$ 200 • Industry/ Research Organizations: Rs. 5000 • Academic Institutions: <ul style="list-style-type: none"> - BSc Students: Rs. 500 - MSc Students: Rs. 1000 - PhD Students: Rs. 1500 - Faculty members: Rs. 2000 <p>The above fee includes all instructional materials, computer use for tutorials, and 24-hr free internet facility. The participants will be provided with single bedded accommodation on payment basis.</p>

The Faculty



Prof. Dr. Vijay K. Juneja is a Lead Scientist of the Predictive Microbiology research project at the Eastern Regional Research Center, ARS, USDA, Wyndmoor, PA. He received a degree in Veterinary Medicine from G.B. Pant University of Agriculture and Technology, Pantnagar, India; M.S. in Animal Science and Ph. D. in Food Technology and Science, both from the University of Tennessee, Knoxville, TN, USA. vijay.juneja@ars.usda.gov

Dr. Juneja is among the world's leading authorities in food safety research. He has developed a nationally and internationally recognized research program on foodborne pathogens, with emphasis on microbiological safety of minimally processed foods and predictive microbiology. Dr. Juneja frequently organizes educational workshops on microbial modeling, specifically on the use of the ARS Pathogen Modeling Program. His research program has been highly productive, generating over 300 publications, including over 150 peer-reviewed journal articles, nine books, and 45 book chapters including eight in the Encyclopedia of Food/Meat Microbiology. He served as a co-editor of the *International Journal of Food Microbiology* until December 2011 and as an Associate Editor for the *Food Microbiology Section*, of the *Journal of Food Science* from 2002–2007. Currently, he serves as an Editor of *LWT-Food Science and Technology* and is a member of the editorial Boards of *Journal of Food Protection*, *Foodborne Pathogens & Disease* and *International Journal of Food Microbiology*.

Dr. Juneja has served in leadership positions in professional societies, notably as Chair, Interagency Botulism Research Coordinating Committee (IBRCC) meeting, Philadelphia (1998, 2008 and 2014); Chair, Institute of Food Technologists (IFT) Nonthermal Processing Division's Workshop, Philadelphia (2005); and Co-chair, International Predictive Microbiology Conference, Washington, DC (2009). He is also a recipient of several awards including the International Association for Food Protection's (IAFP) Harry Haverland Citation Award (2015); NRI Welfare Society of India's Mahatma Gandhi Pravasi Samman Award (2014); IAFP Grocery Manufacturers Association (GMA) Food Safety Award (2013); Gold Medalist, Outstanding Mentor/Coach, Federal Executive Board, Philadelphia (2013); Institute of Food Technologists (IFT) Research and Development Award (2012); National Science Foundation (NSF) Food Safety Leadership Award for Research Advances (2012); Agricultural Research Service (ARS) Technology Transfer Award (2010); Federal Laboratory Consortium Mid-Atlantic Region – Excellence in Technology Transfer Award (2010); Professional Excellence Award by Council of Indian Organization (2009); IAFP Maurice Weber Laboratorian Award (2005); ARS-North Atlantic Area (NAA) Senior Research Scientist of the Year (2002); ARS-NAA Early Career Research Scientist of the Year (1998); and ARS-FSIS Cooperative Research Award (1998). Additionally, he is a Fellow of the IFT (2008) and American Academy of Microbiology (2013).



Prof. Dr. Narpinder Singh is Professor in the Department of Food Science and Technology, Guru Nanak Dev University, Amritsar, India. His expertise is in the field of starch chemistry, extruded products, modified starches, baked products, cereal and legumes quality, milling, honey processing, product development, and selection of raw material, etc. He has published 200 research papers in national and international journals of repute, 10 book chapters (nine international publishers and one national publisher), one book (The RSC), five book reviews, and five technical papers. Dr. Singh has held leadership positions in professional societies, notably the Fellow Association of Food Scientists and Technologist (AFSTI)(2012); S. Bishan Singh Samundri Memorial Lecturership Award (2012) by G.N.D.U.; Certificate of Appreciation by Punjab Agricultural University, Ludhiana (2012); J.C. Bose National Fellowship by Department of Science and Technology (DST), Ministry of Science and Technology (2011); the Rafi Ahmed Kidwai Award by ICAR (2010); Fellow National Academy of Sciences, India (NASI)(2011); Fellow of the Indian National Science Academy (INSA)(2010); Fellow of the National Academy of Agricultural Sciences (NAAS)(2005); Recognition Award-NAAS for contribution in Agricultural Engineering and Technology (2007–08); C.N.R. Rao Educational Foundation Award-G.N.D.U. for Excellence in Research (2007); Ramana Fellowship by DST, Ministry of Science and Technology (2007); Laljee Godhoo Smarak Nidhi Award-AFSTI (2005); Pran Vohra Award-Indian Science Congress Association (1997–98); Appreciation Certificate-Punjab State Council for Science and Technology (1990–93); and the INSA Medal for Young Scientist (1993).

Dr. Singh has an excellent academic record as Coordinator (UGC-SAP) (2012–present); Dean (Faculty of Applied Sciences) (2008–2009 and 2010–2012, G.N.D.U.); Coordinator, University-Industry Linkage Program (2008-2012); Professor, Dept. Food Science and Technology (2000–present, G.N.D.U.); The Royal Society Visiting Fellow, University of East Anglia, Norwich, UK (2007-2008); Visiting Professor, Kansas State University, USA (2006); Coordinator, Centre for Advance Research in Food Sciences, G.N.D.U., (2006–2007); Prof. and Head, Dept. Food Science and Technology, G.N.D.U. (2001–2004); Visiting Professor, Dept. of Human and Health Sciences, Osaka City University, Japan (2004–2005); Visiting Scientist, Institute of Food Research, Norwich, UK (1995–1996); Reader, Dept. Food Science and Technology, G.N.D.U. (1993–2000); Assistant Professor, Dept. Food Sci. and Tech., P.A.U., Ludhiana (1988–1993). He is also serving as Editor-in-Chief of *Journal of Food Science and Technology* (Springer).

Host Faculty and Course Coordinator

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