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GLOBAL INITIATIVE OF ACADEMIC NETWORKS



# ENZYMATIC PROTEIN HYDROLYSATES AND MATERIAL BEHAVIOUR OF IT'S FRACTIONS IN HUMAN NUTRITION.

(Course Code:176021H05)

(19<sup>th</sup> November - 24<sup>th</sup> November, 2018)

*Sponsored by*  
**Ministry of Human Resource Development (MHRD)**  
under  
the scheme **Global Initiative for Academic Network (GIAN)**



*Organised by*  
**Department of Microbiology**  
**Maharshi Dayanand University,**  
**Rohtak-124001, Haryana,**  
**INDIA**

# ENZYMATIC PROTEIN HYDROLYSATES AND MATERIAL BEHAVIOUR OF ITS FRACTIONS IN HUMAN NUTRITION.

MHRD Scheme on Global Initiative on Academic Network (GIAN)

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## 1. Overview

Protein hydrolysates with specific characteristics constitute an alternative to native proteins. This can constitute a part of novel formulation in development of functional foods. The formulations are designed to deliver nutritional support to people with special needs through dietary intervention. The rate of enzyme hydrolysis at different concentrations plays a significant role in food product architecture. The native protein susceptible to the enzyme hydrolysis depends on several factors. The effect of shape and size of these hydrolysates on the thermal parameters, change in glass transition ( $T_g$ ) and denaturation ( $T_d$ ) temperature are explored. Glass transition temperature ( $T_g$ ) is the temperature at which the material changes from the glass to more liquid like rubber in amorphous food ingredients and plays a vital role in controlling their material properties. The plasticizing effects of water, sugar, polyols and other low molecular weight additives are used in food manufacturing to control functional properties are discussed. Protein hydrolysis fractions can act as plasticizers for high molecular weight proteins and may be of interest in a number of food applications.

## Course Outline

The purpose of this course is to understand and explore possible industrial applications of this technology in growing areas of functional foods. This course is designed in two Modules where as the Module 1 deals with manufacturing protein hydrolysates with case studies of one grain sector protein (soy protein) and another dairy sector protein (whey protein) under - the importance of protein hydrolysates. Where as in Module 2 the material, conformational and nutritional properties of hydrolysates produced are discussed in real food formats for improved human nutrition under - material characterization and nutritional properties.

## Relevance and implications to the society/uniqueness and novelty of the course

This program discusses health and wellbeing of common citizens can be achieved through certain food interventions which will be beneficial for healthy ageing. The nutritional benefits of functional foods outlined will be helpful in bringing general awareness in society at large. The main topics of above course will focus on innovation and industrial applications of novel protein hydrolysates through active participations and learning materials. The case studies are designed to gain experience in further understanding and applying this technology not only in functional foods in human nutrition but biotechnology in general. The participants are most welcome to bring research ideas and discuss further for scoping possible technology development and future collaborations.

## 2. Objectives

The primary objectives of the course are as follows:

- 1.To gain insight into protein based functional foods and their applications in human nutrition.
- 2.Understand material behaviour of raw materials used as ingredients through case studies.
- 3.Explore real industrial applications in grain and dairy protein based product prototypes in food manufacturing industries.
- 4.Develop and apply capabilities in cross disciplinary science through further skill development

### 3. Course details

#### 3.1 Tentative Duration:

November 19, 2018 - November 24, 2018

#### 3.2 Tentative Lecture Schedule

##### Day 1 (19 November, 2018)

Lecture 1 : 10:00 to 11:00

Introduction-Current Scenarios

Why hydrolyze proteins?

Lecture 2 : 11:30 to 12:30

Protein - WPI and Soy protein

Tutorial 1 : 14:30 to 16:30

Tutorials based on above concepts

##### Day 2 (20 November, 2018)

Lecture 3 : 10:00 to 11:00

Hydrolysates - Production

Fundamentals - Hydrolysates

Lecture 4 : 11:30 to 12:30

Enzyme selection

Tutorial 2 : 14:30 to 16:30

Tutorials based on above

##### Day 3 (21 November, 2018)

Lecture 5 : 10:00 to 11:00

Analysis-Hydrolysates

Case studies - Soy protein

Lecture 6 : 11:30 to 12:30

Peptide – Characteristics Nutritional Properties

Case studies - WPI

Tutorial 3 : 14:30 to 16:30

Tutorial based on above topics

##### Day 4 (22 November, 2018)

Lecture 7 : 10:00 to 11:00

Flavor release – Sensory

Plasticisers effect, Material Properties, Thermal Properties - Tg

Conformational Changes

Lecture 8 : 11:30 to 12:30

Amino acid profile

Tutorial 4 : 14:30 to 16:30

Tutorial based on above

##### Day 5 (23 December, 2018)

Lecture 9 : 10:00 to 11:00

Functional Food Applications

Lecture 10 : 11:30 to 12:30

Important properties of functional foods

Tutorial 5 : 14:30 to 16:30

Tutorials based on above

**Date of Examination:** November 24, 2018

### 4. Who can attend

- Executives, engineers and researchers from manufacturing, service and government organizations including R&D laboratories.
- Students at all levels (BTech/MSc/MTech/PhD) or Faculty from reputed academic institutions and technical institutions.

## Fee Structure

The participation fees for taking the course is as follows:

**Participants from abroad : US \$300**

**Industry Participants: INR 8,000/-**

**Faculty: INR 4,000/-**

**Students: INR 2,000/- (OBC/UR); INR 1,000 (SC/ST)**

The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The paid hotel/ guest house accommodation may be provided with prior request.

## Foreign Faculty



**Dr. Manoj Kumar Rout** has significant international industry driven research and teaching experience in the leading organisations of the world. He has worked more than 17 years abroad (Australia, USA and Hong Kong) including about 8 years with CSIRO, Australia as a Food Material Scientist. He has He was a full time Associate Professor briefly (2005-2006) in the Department of Biotechnology at Birla Institute of Technology (BIT, Deemed University), Mesra, before relocating to CSIRO, Australia. He has obtained PhD in the area of Food Protein Chemistry (1997) from North-Eastern Hill University (NEHU, Shillong) and a part his doctoral work was carried out at the Department of Biochemistry, Indian Institute of Science (IISc, Bangalore). He has also carried out significant Post-doctoral work at IISc (Bangalore), The University of Hong Kong, University of Pittsburgh (USA) and The Pennsylvania State University (USA). He is the co-founder and director of HARITOSHAN an Australian company and currently based in Melbourne.

## Course Coordinator



**Prof. Pratyooch Shukla** is currently working as Head, Department of Microbiology at Maharshi Dayanand University, Rohtak, India. He was awarded with Indo-USA Professorship at University of Cincinnati, USA. He was awarded with NRF-DUT Post Doctoral Fellowship during 2008-2009 in Enzyme Technology at Durban University of Technology, Durban. His research areas include enzyme technology and protein bioinformatics. He has 16 years research and 18 years of teaching experience in reputed universities of India and abroad. He has written six Books, twenty book chapters, one patent, published more than 100 peer reviewed international publications in reputed SCI journals like Trends in Biotechnology, Frontiers in Pharmacology, Frontiers in Microbiology, Biotechnology for Biofuels, Critical Reviews in Biotechnology, Critical Reviews in Microbiology, Frontiers in Plant Sciences, PLOS One, RSC Advances etc. He has written 7 books which are published by Springer including Editor for Springer Briefs in systems biology series. He has carried out more than 8 R&D projects funded by national and international agencies as PI/Co-PI.

### Course Coordinator

**Prof. Pratyooch Shukla**

GIAN Course Coordinator

Professor and Head

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& pratyooch.shukla@gmail.com

### Local Coordinator

**Prof. J.P Yadav**

Department of Genetics

M.D University, Rohtak 124001

Haryana India

## How to Participate:

- Register yourself on GIAN Portal of IIT Kharagpur (<http://www.gian.iitkgp.ac.in/GREGN/index>)
- Choose the course i.e. "ENZYMATIC PROTEIN HYDROLYSATES AND MATERIAL BEHAVIOUR OF IT'S FRACTIONS IN HUMAN NUTRITION." by drop down menu.
- Fill the registration form and pay the course by DD/Cheque/RTGS
- Scan filled Registration form and send to course coordinator



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Ministry of Human Resource  
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**(19<sup>th</sup> November - 24<sup>th</sup> November, 2018)**

**REGISTRATION FORM**

**PERSONAL DETAILS**

Name of the Applicant : .....  
Designation : .....  
Institution Address : .....  
E-mail : .....  
Mobile Number : .....

Paste recent  
passport size  
coloured  
photograph

**REGISTRATION FEE DETAILS**

By Cheque	
Amount (INR) :	.....
Account Number :	.....
Account Holder's Name :	.....
Cheque No. & Date :	.....

By NEFT	
Amount (INR) :	.....
Account Number :	.....
Account Holder's Name :	.....
Transaction ID & Date :	.....

By Demand Draft	
Amount: .....	DD No. ....
Bank: .....	Date: .....

**Signature**

**Note:**

- Registration should be made in favour of **GIAN, M.D University, Rohtak A/c** via **cheque/online transfer mode** only. (**Bank Name & Address:** State Bank of India, Rohtak, Pin-124001; **Account no. 37868756829; MICR 124002008; IFSC SBIN0004734**)
- Proof of Registration fee should be sent to Prof. Pratyosh Shukla, Department of Microbiology Maharshi Dayanand University, Rohtak-124001, Haryana
- The scanned copy of filled Registration form duly signed by the applicant along with the proof of fee submission should also be sent by E-mail to Prof. Pratyosh Shukla ([hod.microbiology@mdurohtak.ac.in](mailto:hod.microbiology@mdurohtak.ac.in))
- In case the candidate requires an accommodation a separate E-mail regarding this should be sent to [hod.microbiology@mdurohtak.ac.in](mailto:hod.microbiology@mdurohtak.ac.in) **before 19<sup>th</sup> October, 2018.**

**Contact Person:**

**Prof. Pratyosh Shukla**

Course Coordinator (GIAN Course); **email** - [hod.microbiology@mdurohtak.ac.in](mailto:hod.microbiology@mdurohtak.ac.in)  
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