FACULTY OF SCIENCES/LIFE SCIENCES

SYLLABUS

FOR

Pre Ph.D. Course
For Less Than 5 Students in the
Department of Food Science & Technology,
Biotechnology and Botanical &
Environmental Sciences
Examinations: 2018-19

GURU NANAK DEV UNIVERSITY
AMRITSAR

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## Scheme:

<table>
<thead>
<tr>
<th>Course No.</th>
<th>C/E/I</th>
<th>Course Title</th>
<th>Credits</th>
<th>Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSL-901</td>
<td>C</td>
<td>Research Methodology</td>
<td>3 L 1 T - P</td>
<td>4</td>
</tr>
<tr>
<td>FBL-902</td>
<td>C</td>
<td>Advance Analytical Techniques for Plants and Food Materials</td>
<td>3 L - - P</td>
<td>3</td>
</tr>
<tr>
<td>FBL-903</td>
<td>C</td>
<td>Advances in Food Processing Technology</td>
<td>3 L - - P</td>
<td>3</td>
</tr>
<tr>
<td>FBL-904</td>
<td>C</td>
<td>Secondary Metabolites and Nutraceuticals</td>
<td>3 L - - P</td>
<td>3</td>
</tr>
<tr>
<td>FBL-905</td>
<td>C</td>
<td>Fundamentals of Biotechnology</td>
<td>3 L - - P</td>
<td>3</td>
</tr>
<tr>
<td>FTP-906</td>
<td>A</td>
<td>Seminar</td>
<td>- - 1</td>
<td>1</td>
</tr>
<tr>
<td>FTP-906</td>
<td>I</td>
<td>Optional (Outside Department)</td>
<td>- - 1</td>
<td>1</td>
</tr>
</tbody>
</table>
Course For Those Departments Which Have Less Than 5 Students in Pre Ph.D. Course

LSL-901: RESEARCH METHODOLOGY

Credits: 3-1-0

1. **Basic Concepts:** Research process, problem identification, research designs, informal experimental designs. Completing randomized design, randomized block design, Latin square design, factorial designs.

2. **Sampling designs:** Random sampling, complex random sampling, non-probability sampling, measurement and scaling techniques. Data collection.

3. **Processing and analysis of data:** Central tendency, dispersion, asymmetry, correlation, regression analysis, multiple correlation and regression, partial correlation, association, index numbers, time series.

4. **Sampling and testing of hypothesis:** Concept of probability, probability distribution, Normal, Poisson, -square, t-test. Sampling distribution, central limit theorem, Sandler’ A-test, standard error, population mean, population proportion, sample size, confidence intervals, null hypothesis and alternative hypothesis, level of significance, two tailed and one tailed tests, Z-test, t-test, x2-test, F-test, testing of correlation coefficients, ANOVA – one way ANOVA, two way ANOVA Tukey’s HSD.

5. **Non-parametric tests:** Sign test, Fisher-Isrwin test, Mc Nemer test, Wilcoxon Mali test, Wilcoxon, Mann-Whitnerytest, Kruskal-Wallis test, one sample runs test. Spearman’s rank correlation, Kendall’s coefficient of concordance.

6. **Multivariate analysis:** Multiple regression, multiple discriminant analysis, multiple analysis of variance, canonical correlation analysis, Factor analysis cluster analysis, path analysis. Computational techniques.

7. **Survey of literature:** The students will be required to review literature in their respective disciplines and submit an assignment for evaluation.

**References:**

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FBL-902: Advance Analytical Techniques for Plants and Food Materials

Credits: 3-0-0

Note: Students can use the Non-Programmable scientific calculator.

UNIT-I
Applications of the following techniques in analysis of plants and food materials
Extraction techniques: supercritical fluid extraction, microwave assisted extraction, solid phase extraction
Thermal methods in food analysis: TGA, Differential scanning colorimetry, Differential thermal analysis.
Polymerase chain reaction (PCR)

UNIT-II
Chromatographic methods in food analysis: Column, size exclusion and ion exchange.
High Performance liquid chromatography, Gas chromatography, Flash chromatography, LC-MS, GC-MS.
Visible and ultraviolet spectroscopy, Raman spectroscopy, Near-infrared (NIR) spectroscopy.

UNIT-III
Flame photometery, atomic absorption spectroscopy, ICP-MS
X-ray methods: Diffraction, Fluorescence, Electrophoresis, capillary zone electrophoresis.
Nuclear magnetic resonance.

Suggested Readings:

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FBL-903: ADVANCES IN FOOD PROCESSING TECHNOLOGY

Credits: 3-0-0

Note: Students can use the Non-Programmable scientific calculator.

UNIT-I
2. High Pressure processing: Concept, Equipments for HPP Treatment, Mechanism of Microbial Inactivation and its Application in Food Processing.
3. Aseptic Processing—methods of sterilization, aseptic packaging systems.

UNIT-II
5. Electrical Resistance Heating of foods.
7. Supercritical Fluid Extraction and its Application.

UNIT-III
10. High Voltage Pulse Techniques in Food Processing.

Suggested Readings:
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FBL-904: Secondary Metabolites and Nutraceuticals

Credits 3-0-0

Unit-I
Plant phenolics- classification, biosynthesis, lignins, flavonoids- flavones, isoflavonoids (Isoflavones) & flavonols, anthocyanins, tannins- condensed tannins, hydrolysable tannins and polyphenols as functional food ingredients.

Unit-II
Role of plant metabolites in defence against insects and disease, pharmacological properties and medical application of secondary metabolites, role of nutraceuticals in cancer, heart disease, diabetics, stress, osteoarthritis, hypertension.

Unit-III
Nutraceuticals/functional food ingredients: introduction, classification and application in diverse fields. proteins, complex carbohydrates like dietary fibers, probiotic, prebiotics & symbiotic foods and their functional role. nutraceuticals bridging the gap between food and drug; nutraceuticals as antioxidants.

Reference Books:

3. Functional Foods: Biochemical and Processing As pects, Volume 1; Giuseppe Mazza; CRC Press.
5. Dietary Supplements of Plant Origin; Massimo Maffei; CRC Press.
6. Neutraceutical beverages Chemistry, Nutrition and Health effects; FereidoonSahidi, Deepthi K Weerasinghe; American Chemical Society.
7. Vegetables, fruits and herbs in health promotion Ronlad R. Watson;CRC Press.
Course For Those Departments Which Have Less Than 5 Students in Pre Ph.D. Course

FBL-905 Fundamentals of Biotechnology

(Credits 3-0-0)

Unit- I

Introduction to Tissue Engineering: role of scaffolds and growth factors; biomaterials and tissue engineering; organotypic and histotypic cultures; tissue replacement therapy; imaging tissue constructs

Plant Cell Transformation: Strategies for plant cell transformation, regulation of expression of transgenes, selection of transgenic cells, screenable markers, validation of transgenes.

Plant Tissue Culture & Medicinal Biotechnology: Medicinal Natural products and their importance, Role of plant cell and tissue culture in medicinal plants, Genes and Pathway discoveries, Metabolic engineering of alkaloid biosyntheses, Transport, accumulation and storage of secondary metabolities, Biotechnological approaches for quality control of medicinal plants.

Unit- II

Microbial & Fermentation Technology: Molecular approaches to study microbial diversity, the human microbiome project, comparative genomics, gene ontology and microbial sequencing projects, functional metagenomics for microbial enzyme discovery and bioactive metabolites from microbes. Design of bioreactors. Alcoholic beavarage : bear, whisky & wine.

Unit- III

Bioinformatics: Introduction to Bioinformatics, Biological databases: Type of databases, Data Format, Sequence alignment: Scoring matrices, Local and global alignment concepts; Dynamic programming; Database searches for homologous sequences, Multiple sequence alignment. Protein sequence analysis tools, secondary structure prediction, tertiary structure prediction homology modelling, fold recognition, ab initio methods structure visualization and analysis tools.

References:

4. Relevant Research Papers.
Course For Those Departments
Which Have Less Than 5 Students in Pre Ph.D. Course

FTP-906: SEMINAR

Credits: 0-0-1

Optional Subject from Other Department
The Department of Life Sciences Core Education brings together faculty, staff, and students from all six of our Life Science departments to create a common and integrated curriculum for the first years of all undergraduate programs within UCLA’s Division of Life Sciences. Computational & Systems Biology IDP. Computational & Systems Biology (C&SB) is an interdepartmental program designed for highly motivated students interested in interdisciplinary activities in life sciences, behavioral sciences, and the computational, control, communication and information branches of engineering. The UCL Faculty of Life Sciences is one of the 11 constituent faculties of University College London (UCL). The Faculty forms part of the UCL School of Life and Medical Sciences, together with the Faculty of Brain Sciences, the Faculty of Medical Sciences and the Faculty of Population Health Sciences. Chairs of Botany and Comparative Anatomy were established at UCL from its founding in 1826. The Department of Physiology was established at UCL in 1828 and the Department of Pharmacology in 1905. Our Faculty includes over 40 scientists-researchers who have a wide variety of research interests and who teach courses related to their specializations. Read More. Faculty Seminar. Academic consultant registration form. Media Exposure. Prof. Galit Shohat-Ophir and Dr. Amiyaal Ilany. Life Sciences. News. 03/30/2021. More. Timetable summer term 2021. The timetable for summer term 2021 is now online (Last update 30.03.2021). We are looking forward to showing our visitors what exactly is making Rhine-Waal University of Applied Sciences and its interdisciplinary degree programmes so special. Julia Ilg, Head of Student Advisory Service. 05/05/21 2:00 pm. More. Let's talk Scholarships! Bewerbung, Voraussetzungen und Mehr. Sie denken, dass kommen Sie bestimmt nicht in Frage?