KLE
EMPOWERING PROFESSIONALS

KLE Academy of Higher Education & Research
Belagavi
[DEEMED-TO-BE-UNIVERSITY]
REACCREDITED AT THE 'A+' LEVEL BY NAAC (THIRD CYCLE), PLACED IN 'A+' CATEGORY BY MHRD (GoI)

Value Added Course on

Bioinnovations &
Basics of Intellectual Property Rights

KLE COLLEGE OF PHARMACY
TRUTH, LOVE, SERVICE, SACRIFICE
BELAGAVI

Offered by

Dept. of Pharmacognosy
KLE COLLEGE OF PHARMACY
Belagavi

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Our B. Pharm Program has been accreditated by NBA for a period of 6 years (from July 2019 to June 2025)

Preamble:

Economic competitiveness of a country in world depends on its ability to innovate, develop and translate excellent and ground-breaking scientific knowledge into the world market. Innovation is defined as translating any new idea, process, or product, or a change to an existing product or process that adds value to that existing product or service. Innovation is an important element of modern entrepreneurship is essential for sustainable growth and economic development. It is the growth engine for knowledge-driven economy and the progress of any country. Innovations will lead to new businesses as well as to the increased competitiveness of existing enterprises. It is crucial for value creation, growth and employment and innovation processes take place at the enterprise, regional and national level. Innovation fuels one's ability to be competitive both on a corporate and on a personal level.

In today's rapidly changing global economic landscape the most distinct competitive advantage of a business enterprise lies in the ability of businesses to introduce new innovative products to the market faster than their competitors. Bio innovation involves identification, commercialization, and dissemination of novel biological technologies, concepts, models and products in biological sciences. Biotechnology with broad range of applications is one of the key technologies areas that offer full or partial solutions to major societal problems, healthcare, environmental degradation, food security and safety, and energy supply. Biotechnology has the potential both to allow truly sustainable development and contribute to value creation in all sectors of society. Biotechnological process use enzymes, micro-organisms and plants to make products in a wide range of industrial sectors including chemicals, pharmaceuticals, food and feed, paper and pulp, textiles, energy, materials and polymers. New knowledge, developments, tools, technologies, approaches of biotechnology, life sciences can be explored for commercialisation and to strengthen our knowledge-based economy.

The three stages of innovation include the conception of a new idea, its evaluation, its commercialization or practical implementation. Patents are crucial to innovation which can lead in strategic management of economy. Many innovations can be protected through intellectual property (IP) rights. Patent literature is a valuable source of information for Innovation and business success. Collection of patent literature or prior art information search is an integral part of patenting process and is carried out to know whether an invention is new. Patents are excellent starting point for ideas for commercialization and search of products with little or more development. They are extremely comprehensive and largest source of commercially viable technical information and offer a huge insight into existing technologies. They provide new information, data and serve as a source of new ideas in different and related fields. They discuss difficulties and problems associated with previous research, development and production techniques offer clues to new techniques, thinking and methods of overcoming problems. Patents provide selection of various alternate techniques to aid in product design and development.

Universities are responsible for training highly skilled graduates in S&T who carry out cutting edge research, collaborate with industry, and create start-ups. They function as engines of innovation and provide society and its economic system with the needed entrepreneurial and innovation skills, while mobilizing local and global knowledge. This course touches upon translation of product and application oriented research, how to identify unmet needs, transform a scientific knowledge, idea into a business model and real business, how to identify business opportunities in bio, health, life sciences. This course also focuses a lot on sources and analysis of market research of information patent search tips, effective search strategies and methodologies, effective utilization of patent literature. Opportunities for patenting and interesting patents of relevance to bio innovations pharmaceuticals, drug-discovery technologies, biopharmaceuticals, biotechnology, herbal products, their drug delivery systems, nanotechnology and medical R&D inventions are discussed.

This course of "Bio-innovations & Basics of Intellectual property" is designed as value added course designed taking into consideration the stages and innovation principles to strengthen the knowledge, skills and experience of students with a background in science. Overall this course aims to help participants generate few innovative ideas through combination of ideas obtained from different patent literature sources, think of creating innovative products, solutions and support students to innovate and enterprise,

Course Objectives

Objectives of the value added course Bio-innovations & Basics of Intellectual property are to

- Make participants aware of key concepts of innovation, patenting and entrepreneurship
- Apprise the participants with cutting edge bioscience developments and review their translational to bio innovations
- Teach participants the skills of patent search, market research analysis, identifying unmet needs, challenges and opportunities for developing various innovative bio based products.
- Nurture and hone the innovation and entrepreneurship skills of participants
- Develop team work and effective communication skills of participants.

Course Outcomes:

Upon completion of this Value added course, participants will:

- CO1: Discuss the knowledge of key concepts of innovation, patenting and entrepreneurship
- CO2: Identify and present the unmet needs, challenges, and opportunities of bio innovations taught in the course.
- CO3: Elaborate product/ application/ process innovations in herbal cosmetics, natural products
- CO4: Demonstrate the patent search ability and summarize patent, market research information for an innovative bio based product idea.
- CO5: Formulate a novel herbal, biotechnology; food based product or process innovation idea.

Syllabus content:

MODULE I: Bio-Innovations and Entrepreneurship **4 HOURS**

- Understanding innovation
  - Need for innovations, types of innovations
  - innovation process ,innovation index,
- Current topics in bio- innovations
  - Overview of Innovative bio models and concepts
  - Cutting edge technologies in different bio industries
  - Milestones in translation of bio innovations
- Biotechnology innovations
  - Innovations in conventional and modern biotechnology Products
  - Biotechnology process Innovations
  - Conventional and emerging technologies
- Food production, food processing and agricultural technology Innovations
  - Food production Innovations: Role of biotechnology, microalgae technologies
  - Food processing Innovations : New ways of processing, food packaging
  - Agricultural technology Innovations: Sensors, vertical farming, hydroponics

Module Outcome: Upon completion of this module students will able to

MO1: Elaborate different types of innovation, challenges and issues in innovation process

MO2: Identify unmet needs and opportunities in bio- innovations

MO3: Formulate a novel biotechnology food based novel product or application idea.

MODULE II: Basics of Intellectual property rights **4 HOURS**

- Introduction to IP, Types of IP,
  - What is "intellectual property"?
  - Overview of Copyrights, Patents ,Trademarks and other form of IP
  - Patentability criteria for inventions
- Relevance, Importance of IP for protection of innovations and start-ups
  - Link between Innovation, IP and entrepreneurship
  - IPR Benefits for Start-ups in India
  - How IP can address the challenges of entrepreneurs and SME
- How to read, draft a patent
  - Content of patent: Bibliographical and technical data,
  - Patent Specification – Description and Claims
  - Salient features of patent drafting
- Fundamentals of patent search
  - Patents as clue for Innovations, patent search sources
  - Steps and clues involved in patent search.
  - Types of patent search: state of the art, prior art/novelty/patentability, freedom to operate, opposition, and (in)validity searches

Module Outcome: Upon completion of this module students will able to

MO1: Distinguish and explain various forms of IP

MO2: Elaborate the benefits of IP, the link between Innovation, IP and entrepreneurship

MO3: Demonstrate the basic patent search ability

MODULE III: Innovations and IPR opportunities in nutraceutical products 4 HOURS

- An overview of nutraceutical s, products and their processing
  - Types of nutraceutical products, Benefits of nutraceuticals
- Trends and Innovations in nutraceutical products
  - Facts and figures from market research reports
  - Nutraceuticals Industry: Market Demand by types
  - Successful innovative products
- Issues, challenges of commercialization in nutraceuticals
  - Processing ,product development, technical and market challenges
  - Intellectual Property in nutraceuticals: Patents, Trademarks, and Trade Secrets
  - Case studies of Patent protected innovations
- Understanding nutraceutical Innovations through patent search
  - Study of Patents Involved in nutraceuticals formulations
  - Study of Patents Involved in nutritional Supplements
  - Study of Patents Involved in process technology

Module Outcome: Upon completion of this module students will able to

MO1: Comprehend and report the nutraceutical technical, market research knowledge

MO2: Identify the unmet needs, challenges, and opportunities for nutraceutical product development in entrepreneurship context.

MO3: Demonstrate patent search ability and formulate an innovative nutraceutical idea.

MODULE IV: Innovations, IPR opportunities in herbal cosmetics, flavours and fragrances. 4 HOURS

- An overview of herbal cosmetics, flavours and fragrance products
  - Types of herbal cosmetics, Sources of raw materials, flavours and fragrance products
- Trends, Innovations and opportunities in development of herbal cosmetics and fragrances.
  - Facts and figures, market demand by types and region from market research reports
  - Successful process, product innovations, Leading industrial players
- Issues, challenges of commercialization
  - Processing ,product development challenges
  - Technical and market, Intellectual Property challenges
  - Case studies of Patent protected innovations
- Understanding herbal cosmetics innovations through patent search
  - Study of Patents Involved in herbal cosmetics
  - Study of Patents Involved in flavours and fragrances
  - Study of Patents Involved in process technology

Module Outcome: **Upon completion of this module students must be able to**

MO1: Share a brief overview of the technical, market research knowledge and know-how of herbal cosmetics, flavour and fragrances.

MO2: Identify and present the unmet needs challenges, impact and opportunities of Fragrance & Flavour in entrepreneurship context.

MO3: Search, comprehend and present the patent literature information, identify patenting opportunity and formulate an innovative product **/** process idea.

MODULE V: Innovations and IPR opportunities in Natural dyes and applications 4 HOURS

- An overview of natural dyes,
  - Sources, biodiversity and types ,Benefits and applications
  - Cultivation and extraction of natural dyes
- Trends and Innovations in natural dye based products and application
  - Facts and figures from market research reports
  - Market demand by types and application
  - Successful innovative products
- Issues and opportunities for commercialization of natural dye products and applications
  - Demand ,supply, yield, Processing ,product development challenges
  - Technical and market challenges
- Understanding natural dyes through patent search
  - Study of Patents Involved in natural dye sources, natural dye based product and applications
  - Study of Patents Involved in process technology

Module Outcome: Upon completion of this module students will able to

MO1: Summarize and present technical, market research knowledge of natural dyes,
MO2: Identify and discuss the unmet needs challenges, impact and opportunities of natural dyes and their applications in entrepreneurship context.
MO3: Search, identify patenting opportunity and formulate a product, process or application idea of natural dyes.

MODULE VI: Innovations and IPR opportunities drug discovery & bioinstrumentation. 4 HOURS

- An overview of drug discovery process and bio lead identification
  - Challenges and opportunities in natural product drug discovery
  - Opportunities for bio lead discovery from different natural product sources
  - Opportunities through innovation in assay systems,
- Biomedical Innovations
  - Design and implementation of bio discoveries in health
  - Facts and figures ,market demand by types and application
  - Successful biomedical innovations
- Research Bio instrumentation innovations
  - An overview and need for development of chromatography, spectroscopy ,optical and electrical method based bioinstrumentation
  - Facts and figures ,market demand by types and application
  - Successful bioinstrumentation innovations
- Understanding innovations of bio discovery, through patent search
  - Study of Patents relevant to bio leads and secondary metabolites
  - Study of Patents Involved in biomedical, bio instrumentation innovation
  - Study of Patents Involved in process technology

MO1: Comprehend, present technical, market research data and knowledge relevant to drug discovery and bioinstrumentation.

MO2: Identify, elaborate the unmet needs challenges, impact and opportunities in biomedical innovation

MO3: Search, comprehend the relevant patent information and formulate an innovative product, process or an application idea.

MODULE VI: 6 HOURS

Overview to Advanced Excel

Section One - Make a Start with Excel

- What is a Spreadsheet?
- Excel Rows and Columns
- Enter Text and numbers in a cell
- Data Formatting - Font formatting, Number formatting, colour of a cell; centre text and numbers; Table formatting, Conditional formatting, Hide/Unhide; Sort / filter, paste special, Find and select
- Text Functions Using: Mid/Search/Left/Right Functions; Using Trim/Clean/Upper/Lower Functions; Using Substitute/Text Functions; Using Trim/Clean/Proper/Dollar Function
- Currency symbols in excel
- How to save your work in excel

Section Two - Excel Formulae

- The SUM Function
- How to multiply in excel
- Subtract and Divide
- Combine the Arithmetic Operators
- Formula Auditing
- The Average Function
- The Date & Time Function

Section Three - Microsoft spreadsheet Features

- Advanced Filters - Extracting Records with Advanced Filter; Using Formulas in Criteria
- Advanced Sorting - Sorting by Top to Bottom/Left to Right; Creating/Deleting Custom List; Sort by using Custom List
- How to Merge cells
- Data Import from Web, Text (Text to columns)
- Removing Duplicates
- How to use Auto fill in excel
- How to Sort data in excel
- Searching with MATCH and INDEX
- How to Create an Excel Template
- Data Forms in Excel
- Drop Down Lists in Excel
- Add your own Error Messages
- Array Formulas Intermediate Excel
- Frequency Distribution Intermediate Excel
- Hyperlinks in Excel

Section Four - Microsoft Excel Pivot Tables & Charts

- Excel Pivot Tables (Creating, Formatting Simple PivotTables), Creating / Modifying a PivotChart
- Create an excel chart
- Formatting Charts: Move and Resize your chart; Charts Styles and Layouts; Adding Chart Titles and Series Titles Legends / Lables
- Formatting / Renaming / Deleting Data Series; Changing the Order of Data Series; Chart Layout Panel in Excel
- Printing Charts
- Adding Data to a Chart;
- Create Pie chart in Excel
- Format Pie chart segments
- Create a 2D line Chart in Excel (Combo Charts – Secondary Axis)
- Format your Axis titles
- Predict the future with a Trendline chart
- Sparkline charts
- Section Five - Conditional Logic
- 'IF' Function
- Conditional Formatting in excel
- Statistical Functions:
- CountIF, Count IFS, SUMIF, SUMIFS, AverageIf, AverageIfs, Nested IF, IFERROR Statement, AND, OR, NOT; LARGER / SMALLER Functions (Colour coding & data rearrangement)
- Absolute Cell References

Section Five - Advanced Excel – Data Processing & LOOKUP Functions

- Reference other Worksheets
- LOOKUP Function: VLOOKUP/HLOOKUP Function in Excel; Index and Match; Creating Smooth User Interface Using Lookup; Nested VLookup; Reverse Lookup using Choose Function

Arrays Functions - Array Formulas, Use of the Array Formulas; Basic Examples of Arrays (Using ctrl+shift+enter); Array with if, len and mid functions formulas; Array with Lookup functions; Advanced Use of formulas with Array.

Module Outcomes: Upon completion of this module students will be able to:

1. Create & Edit worksheets
2. Process data sets using Outline, autofilter & pivot tables
3. Process data sets employing Excel Formulae & produce statistical results
4. Extract and modify data with search and replace, use conditional formatting to highlight specific data
5. Creates and format PivotTables & Charts

Validate data using LOOKUP features

Reference Books:

Agarwal, Swati, Sonu Kumari, and Suphiya Khan, eds. *Bioentrepreneurship and Transferring Technology Into Product Development*. IGI Global, 2021.

Brenner, Thomas, and Holger Patzelt, eds. *Handbook of Bioentrepreneurship*. Springer-Verlag New York, 2008.

Douthwaite, M. B. Enabling innovation: A practical guide to understanding and fostering technological change. Zed Books, 2002.

Carayannis, Elias G., Elpida T. Samara, and Yannis L. Bakouros. *Innovation and entrepreneurship: theory, policy and practice*. Springer, 2015.

Hitchcock, David. Patent Searching Made Easy: How to do Patent Searches Online and in the Library. Nolo, 2022.

Prabu, Sakthivel Lakshmana, and Suriyaprakash Tnk, eds. Intellectual Property Rights. BoD–Books on Demand, 2017.

Jeffrey G. Sheldon, How to Write a Patent Application, Third Edition, Practising Law Institute, 2016.

Galanakis, Charis M., ed. *Nutraceuticals and natural product pharmaceuticals*. Academic Press, 2019.

Galanakis, Charis M., ed. Nutraceutical and functional food components: Effects of innovative processing techniques. Academic Press, 2021.

Panda, Sandeep Kumar, and Prathapkumar Halady Shetty, eds. *Innovations in technologies for fermented food and beverage industries*. Berlin: Springer, 2018.

Petruzzelli, Antonio, and Vito Albino. When tradition turns into innovation: how firms can create and appropriate value through tradition. Elsevier, 2014.

Setapar, Siti Hamidah Mohd, Akil Ahmad, and Mohammad Jawaid, eds. Nanotechnology for the Preparation of Cosmetics using Plant-Based Extracts. Elsevier, 2022.

Delgado-Vargas, Francisco. Natural colorants for food and nutraceutical uses. CRC press, 2002.

National Institute of Industrial Research (India). Board of Consultants & Engineers. The Complete book on Natural Dyes & Pigments. Asia Pacific Business Press, 2006.

Vankar, Padma S. Handbook on Natural Dyes for Industrial Applications (Niir Project Consultancy Services, 2016.

Bechtold, Thomas, and Rita Mussak, eds. Handbook of natural colorants. Vol. 8. John Wiley & Sons, 2009.

Vankar, Padma Shree, and Dhara Shukla. New trends in natural dyes for textiles. Woodhead Publishing, 2019.

Yi, Doogab. "Beyond Technonationalism: Biomedical Innovation and Entrepreneurship in Asia. By KATHRYN C. IBATA-ARENS. Stanford, Calif.: California Stanford Business Books, 2019. xii, 338 pp. ISBN: 9781503605473 (cloth)." *The Journal of Asian Studies* 79.2 (2020): 556-558.

Rosales-Mendoza, Sergio, Mauricio Comas-García, and Omar González-Ortega, eds. Biomedical innovations to combat COVID-19. Academic Press, 2021.

Verma, Deepak Kumar, Megh R. Goya, and Hafiz Anasr Rasul Suleria, eds. Nanotechnology and Nanomaterial Applications in Food, Health, and Biomedical Sciences. CRC Press, 2019.

Teaching Methodology:

- Conventional, innovative teaching methodologies for enhanced student learning.
- Teaching by mentoring, professional activities, learning resources, assessmentFeed back

Resource persons:

- Experienced teachers from KAHER and other reputed institutions,
- Industry and research experts

Suggested Class Room Activities

- Presentations on selected topics,
- Quizzes, Assignments, Discussions, Tutorials Report submission on selected topics,

Assessment:

Formative assessment (25%): 25marks

Formative assessment structure.

Formative Assessment	Max Marks
Assignment	10
Presentation of case study	15
Total	25

Summative assessment (75%): 75marks

End term exam of 75 marks will be conducted to award total exam score. Question paper willbe set as per the university rules applied to other courses. Exam Score: 40% passing criterion will be based on Formative assessment plus Summative assessment scores. Attendance, Participation and feedback. 80% attendance is compulsory to complete this course.

Summative assessment structure.

Summative Assessment	MCQ	Long essay	Short essay	Max Marks /Total
Final exam	10	10	5	25
Final Presentation	1			25
Final report (Learning from the Course)	1			15
Continuous Mode(CM) (Attendance, Interaction)				10
Total				75

Students may need to download the material and information presented in this course. Students are expected to actively participate in discussion.

Students will be provided with study links/online and offline learning resources. Careful listening of the lectures, constructive criticism, analytical questions and feedback on recorded lectures and readings.

Eligibility: Final and pre-final undergraduates, postgraduates of pharmacy and life science sstream who have an interest in innovation and entrepreneurship.

Duration: 30 hrs of lectures spread over 3 Months

Fees/Charges: As per University norms.

Added Benefits for the Participating Students:

- Expanded and enriched knowledge of bio products and bio innovations
- Nurturing the innovation and entrepreneurship, start-ups skills
- Enhanced Patent search and market research skills
- Improved soft skills

Career Prospects:

- Added advantage for higher studies
- Enhanced soft skills and expanded horizon of knowledge will employability skills
- Innovation manager, Innovation consultant,
- Business development manager, Business (model) designer
- Entrepreneur, freelancers
- Enhanced opportunities as
  - R&D/Product development Scientists
  - Production and process development executives/managers
  - IP Examiners, Consultants

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Alchemizing Pharma Education

Highlights of the Course

- Enriched knowledge of bio products and bio innovations
- Nurturing the innovation entrepreneurship and start-ups skills
- Enhanced Patent search and market research skills
- Improved soft skills and employability skills